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IN THE  
**Supreme Court of the United States**  
OCTOBER TERM, A. D. 1937.

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No. 608

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LINCOLN ENGINEERING CO. OF ILLINOIS,  
*Defendant-Petitioner,*  
*vs.*

STEWART-WARNER CORPORATION,  
*Plaintiff-Respondent.*

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**APPENDIX TO RESPONDENT'S BRIEF.**

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**CONTAINING**

1. Sec. 4884, Sec. 4886 and Sec. 4888 Revised Statutes.
  2. The Opinions, Findings and Conclusions of the 7th C. C. A. and the District Court in This Cause.
  3. Excerpts from the Opinions in the 12 Cases Cited in Foot-note 4 to the Opinion of the United States Supreme Court in *Bassick v. Hollingshead* and *Rogers v. Alemite*, 298 U. S. 415, 80 L. Ed. 1251.
  4. Copies of Phonograph Patents Referred to in Discussions of *Leeds & Catlin v. Victor*.
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/ LYNN A. WILLIAMS,  
*Counsel for Respondent.*

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(1) Berliner	534,543
(2) Edison	200,521
(3) Edison	227,679
(4) Bell & Tainter	341,214
(5) Berliner	372,786
(6) Berliner	382,790



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## REVISED STATUTES.

Referred to on pages 97, 94 and 87 respectively of respondent's brief. The statutes here incorporated are those in force on the date of the filing of the application for the Butler patent in suit on February 19, 1923. They were subsequently amended to provide for plant patents.

SECTION 4884. Every patent shall contain a short title or description of the invention or discovery, correctly indicating its nature and design, and a grant to the patentee, his heirs or assigns, for the term of seventeen years, of the exclusive right to make, use, and vend the invention or discovery throughout the United States, and the Territories thereof, referring to the specification for the particulars thereof. A copy of the specification and drawings shall be annexed to the patent and be a part thereof.

SECTION 4886. Any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvements thereof, not known or used by others in this country, before his invention or discovery thereof, and not patented or described in any printed publication in this or any foreign country, before his invention or discovery thereof, or more than two years prior to his application, and not in public use or on sale in this country for more than two years prior to his application, unless the same is proved to have been abandoned, may, upon payment of the fees required by law, and other due proceeding had, obtain a patent therefor.

SECTION 4888. Before any inventor or discoverer shall receive a patent for his invention or discovery he shall make application therefor, in writing, to the Commissioner of Patents, and shall file in the Patent Office a written description of the same, and of the manner and process of making, constructing, compounding, and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct, compound, and use the

same; and in case of a machine, he shall explain the principle thereof, and the best mode in which he has contemplated applying that principle, so as to distinguish it from other inventions; and he shall particularly point out and distinctly claim the part, improvement, or combination which he claims as his invention or discovery. The specification and claim shall be signed by the inventor.





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# SUPREME COURT OF THE UNITED STATES.

No. 608.—OCTOBER TERM, 1937.

Lincoln Engineering Company of Illinois, Petitioner,  
vs.  
Stewart-Warner Corporation.

On Writ of Certiorari to  
the United States Circuit  
Court of Appeals for the  
Seventh Circuit.

[March 28, 1938.]

Mr. Justice ROBERTS delivered the opinion of the Court.

The District Court<sup>1</sup> and the Circuit Court of Appeals<sup>2</sup> have held the petitioner guilty of contributory infringement of the Butler Patent No. 1,593,791. We granted certiorari because of alleged conflict with our decision in *Rogers v. Alemite Corporation* reported with *Bassick Manufacturing Co. v. Hollingshead Co.*, 298 U. S. 415. Like that in the *Rogers* case, the patent in suit has to do with apparatus for lubricating bearings, especially those of automobiles, by the use of a nipple or fitting connected with the bearing, a gun consisting of a compressor or pump for propelling the lubricant under high pressure, a hose or conduit to connect the pump with the fitting, and a means of coupling the conduit to the fitting to make a tight joint during the operation of greasing. Both respondent and petitioner market apparatus for pressure lubrication, including fittings and guns. The charge is that the petitioner sells fittings such as are described in the respondent's patent which are usable, and intended to be used, in connection with the gun and coupler of the patent.

What was said in our earlier decision in respect of the prior art need not be repeated. Butler's alleged invention is in the same field and deals with similar apparatus as did Gullborg's patent, considered in the *Rogers* case. As there shown, it was old practice in the lubrication of bearings to use in combination a fitting connected with the bearing through which oil or grease was to be

<sup>1</sup> 15 F. Supp. 571; 16 F. Supp. 778.

<sup>2</sup> 91 F. (2d) 757.

propelled into the bearing and a gun, which was joined to the fitting by a coupler. In the greasing operation the coupler is fastened to the head of the fitting and the pump is operated to drive the lubricant through the fitting to the bearing. Not only was this combination old but the elements long used in the art varied in design and dimension. Fittings were of different sizes and shapes and had diverse arrangements for their closure when not in actual use for the injection of lubricant. Guns were of many sizes and types. Various forms of coupler had been used for sealing the connection between the pump hose and the fitting. In the *Rogers* case it appeared that fittings with lugs or pins to be engaged by the coupler were old but that Gullborg had obtained a patent for a new form of pin fitting the novel feature of which was means of automatic closure and opening for admittance of the grease in connection with a pin which passed through the bore of the fitting. This was not the patent there in suit. Gullborg also obtained a patent in which the novel feature of certain claims was a bayonet-slotted coupler so designed as to cooperate with a pin fitting (including one of the type covered by his other patent), to permit the building up of very high pressure and, by its operation upon disengagement, to obviate exudation of grease about the head of the fitting. In other claims Gullborg claimed a combination of a pin fitting, of the type covered by his fitting patent, a pump, a discharge conduit secured to the pump, and a hollow coupling member of any type (whether old and unpatented or of the improved construction disclosed in the patent) for receiving the closed end of the fitting. In the *Rogers* case the owner of the patent asserted the sale of any grease gun for use with the patented pin fitting of Gullborg, or the sale of any pin fitting, whether of the Gullborg type or of an old type, susceptible of use with the improved Gullborg coupler, constituted contributory infringement of the patent. We held that as the combination of pump, connecting conduit, coupler, and fitting was old, Gullborg could not, by inventing a new and improved type of coupler or fitting claim either of these in combination with the old forms of the other elements so as to exclude the public from the use and sale of the old forms of fittings or grease guns even though these might be used respectively with Gullborg's improved coupler or his improved pin fittings, because, in the combinations claimed, an old-type pin fitting, or an old-type

coupler had no novel function over those of the prior art. We said that if Gullborg had invented anything he had invented an improved pin fitting and an improved coupler and that to allow him to claim either in combination with old elements which performed no new function, would be to permit him to extend the monopoly of his invention to those old and well known devices.

With this background we turn to the patent in suit. Like that of Gullborg, the claim is for a combination. It is as follows:

"2. The combination with a headed nipple for receiving lubricant, of a lubricant compressor having a coupling member for connecting said compressor and nipple comprising a cylinder, a piston movable within the cylinder, and having an aperture for the discharge of lubricant thereof, an apertured sealing seat carried by said piston for engagement with the end of the nipple, connecting the piston aperture with a passage through the nipple, radially movable locking elements carried by the cylinder coacting with the nipple and actuated by said piston for compressively clutching the elements upon the nipple whereby the pressure of the lubricant on said piston will move the piston to forcibly compress said elements while the lubricant is passing through said connecting parts."

In its petition for certiorari, and in argument upon the merits, the petitioner insisted that the respondent's commercial form of coupler was not that of the Butler patent; that the Circuit Court of Appeals for the Eighth Circuit Court had so held,<sup>3</sup> and that the courts below erred in not reaching a similar conclusion. In view of the grounds of our decision we find it unnecessary to pass upon this question.

The petitioner's principal contention is that our decision in the *Rogers* case is controlling.<sup>4</sup> We so hold. As has been said, the combination of elements disclosed is old in the art. As the Circuit Court of Appeals held, a headed nipple or fitting connected with the bearing, and to be coupled to the conduit from the grease gun, is old and unpatentable. A compressor or pump for propelling lubricant is old and unpatentable as such. The invention, if any, which Butler made was an improvement in what he styles in his specifications the "chuck" and in his claim a "coupling member".

<sup>3</sup> *Stewart-Warner Corp. v. Jiffy Lubricator Co.*, 81 F. (2d) 786.

<sup>4</sup> The District Court for Western Pennsylvania has so held: *Stewart-Warner Corp. v. Rogers*, 15 F. Supp. 410; and see *Jacques v. Universal Lubricating Systems*, D. C. W. D. Pa., decided Feb. 4, 1938.



It is not denied that multi-jawed chucks had been used in industry and as couplers in lubricating apparatus. Butler may have devised a patentable improvement in such a chuck in the respect that the multiple jaws in his device are closed over the nipple by the pressure of the grease, but we think he did no more than this. As we said of Gullborg in the *Rogers* case, having hit upon this improvement he did not patent it as such but attempted to claim it in combination with other old elements which performed no new function in his claimed combination. The patent is therefore void as claiming more than the applicant invented. The mere aggregation of a number of old parts or elements which, in the aggregation, perform or produce no new or different function or operation than that theretofore performed or produced by them, is not patentable invention.<sup>5</sup> And the improvement of one part of an old combination gives no right to claim that improvement in combination with other old parts which perform no new function in the combination.<sup>6</sup> Though the respondent so concedes, it urges that, in the combination of the Butler patent, the headed nipple performs a new and different function from that which it has heretofore performed, in other combinations, in that, when the coupler is withdrawn from the nipple, at the end of the greasing operation, the rounded head of the nipple "cocks" the jaws of the coupler for the next operation. The suggestion seems to be an afterthought. No such function of the nipple is hinted at in the specifications of the patent. If this were so vital an element in the functioning

<sup>5</sup> *Pickering v. McCullough*, 104 U. S. 310; *Burt v. Ivory*, 133 U. S. 349; *Brinkerhoff v. Aloe*, 146 U. S. 515; *Office Specialty Mfg. Co. v. Fenton Metallic Mfg. Co.*, 174 U. S. 492.

<sup>6</sup> *Heald v. Rice*, 104 U. S. 737, 754; *Underwood v. Gerber*, 149 U. S. 224, 227, 229; *Deering v. Winona Harvester Works*, 155 U. S. 286, 302; *Perry v. Cooperative Foundry Co.*, 12 Fed. 436, 438; *Yale Lock Mfg. Co. v. Berkshire Nat. Bank*, 17 Fed. 531, 532, 535; *Troy Laundry Machinery Co. v. Bunell*, 27 Fed. 810, 813; *Gates Iron Works v. Fraser*, 42 Fed. 49, affirmed 153 U. S. 332; *Abbott Machine Co. v. Bonn*, 51 Fed. 223, 226; *In re McNeill*, 20 App. D. C. 294; *In re Ratican*, 36 App. D. C. 95; *Kuraheedt Mfg. Co. v. Naday*, 103 Fed. 948; *Langan v. Warren Axe & Tool Co.*, 184 Fed. 720, 721; *In re Bliss*, 39 App. D. C. 453; *Robinson v. Tubular Woven Fabric Co.*, 243 Fed. 526, 542; *Troy Wagon Works Co. v. Ohio Trailer Co.*, 274 Fed. 612, 621; *General Electric Co. v. Ohio Brass Co.*, 277 Fed. 917, 924; *Radio Corporation v. Lord*, 28 F. (2d) 257, 260; *Schiller v. Robertson*, 28 F. (2d) 301, 305; *Fruehauf Trailer Co. v. Highway Trailer Co.*, 54 F. (2d) 691, 709; *In re Germantown Trust Co.*, 57 F. (2d) 365, 366; *McGrath Holding Corp. v. Anzell*, 58 F. (2d) 205; *Kodel Electric Co. v. Warren Clock Co.*, 62 F. (2d) 692, 695; *Alemite Corp. v. Lubrair Corp.*, 62 F. (2d) 898, 900; *In re Reed*, 76 F. (2d) 907, 909.

of the apparatus it is strange that all mention of it was omitted.<sup>1</sup> Moreover, the argument is unsound since the old art includes instances where the head of a nipple or fitting performs a similar function when the chuck is disengaged from it. The same argument was unavailing in the *Rogers* case. It was there contended that the pin fitting of the Gullborg patent performed a new function in causing the beneficial operation of the coupler at the moment of disengagement. We commented upon the matter thus: "The design of the bayonet slots is such that, in uncoupling, the coupling member of the gun will at first be moved slightly forward on the pin fitting thus backing up the perforated washer in the bore of the coupler." But there, as in the present case, it was the peculiar and improved mechanism of the coupler which brought about the result and not the form of the fitting. We suppose that a headed nipple has always been so headed in order that the jaws of the chuck may slip over the head in the coupling and uncoupling operation. The weakness of the respondent's position is well illustrated by what developed at argument. When interrogated as to how in the claimed combination the function of the nipple could be thought novel in any different sense than the function of the pump, counsel replied that the pump performed a novel function because the pressure it generated forced forward the piston in the coupler and caused the movable jaws to engage the fitting. If this argument is sound, the respondent may convict every one who sells a grease pump of contributory infringement. The answer is the same as in the case of the headed nipple. The function of a pump has always been to force a fluid or a grease through a conduit. The fact that this function of the pump is utilized in Butler's improved form of coupler not only to convey the lubricant to the bearing but to operate the jaws of the chuck does not alter the function of the pump. The invention, if any, lies in the improvement in the coupling device alone.

The courts below and the respondent rely upon *Leeds and Catlin v. Victor Talking Machine Co.*, 213 U. S. 301, 325. In the *Rogers* case we held that authority not controlling. Berliner disclosed an entirely novel principle; he utilized the flat disc having a smooth bottomed groove with spiral waves in its sides not only

<sup>1</sup> *Union Edge Setter Co., v. Keith*, 139 U. S. 530, 539; *Ball and Socket Fastener Co. v. Kraetzer*, 150 U. S. 111, 116; *MacColl v. Knowles Loom Works*, 95 Fed. 982; *Kurscheidt Mfg. Co. v. Naday*, 103 Fed. 948, 950.



to agitate the needle connected to the diaphragm, but, in combination with a swinging arm, to propel the needle lengthwise the groove. In his combination, the disc not only performed a new function but performed it in combination with another new element,—the swinging arm which carried the needle.

We conclude that Butler's effort, by the use of a combination claim, to extend the monopoly of his invention of an improved form of chuck or coupler to old parts or elements having no new function when operated in connection with the coupler renders the claim void.

*Decree reversed.*

Mr. Chief Justice HUGHES and Mr. Justice CARDOZO took no part in the consideration or decision of this case.

A true copy.

Test:

*Clerk, Supreme Court, U. S.*

**STEWART-WARNER CORPORATION v. LE VALLY et al.**  
**No. 13955.**

District Court, N. D. Illinois, E. D.  
July 15, 1936.

**1. Patents**  $\Rightarrow$  26(1)

"Combination patent" may consist either of one or more old elements, plus one or more new elements; or of a plurality of elements, all of which are old; or of a plurality of elements, all of which are new.

[Ed. Note.—For other definitions of "Combination Patent," see Words & Phrases.]

**2. Patents**  $\Rightarrow$  26(14)

Old elements in new valid combination constitute "invention" and are as much a unit in contemplation of law as a single or noncomposite instrument.

[Ed. Note.—For other definitions of "Invent; Invention," see Words & Phrases.]

**3. Patent**  $\Rightarrow$  26(14)

No one element of combination patent is gist of combination, but it is the co-operative, co-ordinating, unified result, wherein the various elements contribute to one unitary result, which constitutes "invention."

**4. Patents**  $\Rightarrow$  26(2)

New combination of old elements, each of which contributes to new and unitary result, is patentable.

**5. Patents**  $\Rightarrow$  260

Defendant in suit for contributory infringement of patent which did not begin manufacture of infringing device until after commercial success was achieved by assignee of patent was estopped from asserting that patentee's nonuse rendered patent subject to strict construction.

**6. Patents**  $\Rightarrow$  328

Butler patent, No. 1,593,791, claim 2, describing combination for lubricating automobiles, held valid and contributorily infringed by manufacturer of fittings which

were sold with knowledge and understanding that they were to be used in co-operation with one element of patented combination.

In Equity. Suit by the Stewart-Warner Corporation against John R. Le Vally and another, doing business as the Lincoln Engineering Company of Illinois, and another for contributory infringement of one claim of a patent.

Decree in accordance with opinion.

Williams, Bradbury, McCaleb & Hinkle, of Chicago, Ill., for plaintiff.

Wilkinson, Huxley, Byron & Knight, of Chicago, Ill., and Delos G. Haynes and Lloyd R. Koenig, both of St. Louis, Mo., for defendants.

LINDLEY, District Judge.

Plaintiff, as assignee and owner of patent No. 1,593,791 to Butler, applied for February 19, 1923, and allowed July 27, 1926, sues the Lincoln Engineering Company of Illinois for contributory infringement of claim 2. The defenses are invalidity and noninfringement.

Claim 2<sup>1</sup> of the Butler patent describes a lubricating system for automobiles or other machines, essentially high pressure in character, in which each bearing is provided with a headed nipple for receiving oil or grease of a lubricant compressor having a coupling member for connecting said compressor with the nipples. The coupler is slipped easily and somewhat loosely over the nipple head. As the operator pushes on the compressor, the pressure of the lubricant moves a piston within the cylinder in such a manner as to cause the locking or gripping jaws to clutch or grab about or upon the nipple head. At the same time the grease under pressure acts also upon an apertured sealing seat, carried by the jaws and actuated by the piston in such a way as to engage the end of the nipple and thereby produce a tight seal. Gripping, grabbing, or clutching of

<sup>1</sup>Claim 2. The combination with a headed nipple for receiving lubricant, of a lubricant compressor having a coupling member for connecting said compressor and nipple comprising a cylinder, a piston movable within the cylinder, and having an aperture for the discharge of lubricant thereof, an apertured sealing seat carried by said piston for engagement with the end of the nipple, connecting the pis-

ton aperture with a passage through the nipple radially movable locking elements carried by the cylinder coacting with the nipple and actuated by said piston for compressively clutching the elements upon the nipple whereby the pressure of the lubricant on said piston will move the piston to forcibly compress said elements while the lubricant is passing through said connecting parts.

the nipple is effected automatically, and engagement of the seal against the end of the nipple is achieved in the same manner. Both of these functions are effectuated by the pressure of the lubricant, without other manipulation of the coupler. Thus, the coupler and nipple are so constructed as to produce an essential relationship between the two functions and the mechanism for performing them. Yet each of the two functions is carried out completely and perfectly without interference by the other. As a result, the operation is successful even though there be considerable variation in the precise dimensions in the forms and parts involved.

Upon analysis we find that the claim includes seven elements; namely, a headed nipple, a compressor or pump, a cylinder, a piston, an opening in the piston, a sealing seat, and laterally or radially moving locking elements or jaws. Admittedly, each of these elements is old, and plaintiff makes no claim of invention because of the presence of any one of the particular elements, but insists that invention resides in a new combination of old elements so associated, related and interrelated as to accomplish a new result.

The headed nipples are adapted to be screwed to each of the bearings of an automobile; the compressors are intended to be filled with grease and then to be coupled in succession to each of the nipples in order to inject grease into the openings of the several bearings. Consequently, the combination of the nipple, compressor, and coupler is brought together only periodically and temporarily and in the hands of the owners or servicers of the car. The manufacturer of the car buys the headed nipples and inserts them in the bearings. An automobile may require 25 to 60 such fittings. Some bearings can be conveniently greased with a straight nipple; others with an elbow nipple, at angles varying from 90° to 22½°. Some of the nipples are long, others short, and they are screwed into holes tapped with different pipe thread sizes. Consequently, the manufacturer of the device separately lists and prices each of the sizes of compressor which may be coupled to and used in conjunction with the nipples. Thus the purchaser may buy such nipples as he desires and a compressor of small capacity or one of large capacity, or even a power-driven compressor. An automobile owner may never use a compressor. He may have his car greased at a garage,

and in such case the combination occurs only when the car is greased.

In this respect the combination differs from that usually found in industry. Ordinarily, a manufacturer makes and sells the complete combination, but in the business of high-pressure lubricating equipment, the parts are necessarily sold separately. So, prior to the commencement of this suit, some 6,000,000 Alemite hydraulic guns or compressors claimed to have been embodied within the Butler patent were sold by plaintiff, and during the same period it distributed some 218,000,000 of its so-called Alemite hydraulic system nipples.

For seven years prior to January, 1933, the Lincoln Engineering Company of St. Louis, Mo., who is defending this suit, and who is treated herein as the real defendant, had manufactured grease guns for plaintiff. The latter took all of its product. Stewart-Warner had furnished couplers and nozzles to Lincoln, and the latter had incorporated them in compressors, which it in turn sold to Stewart-Warner. These compressors and nozzles were used in combination with hundreds of millions of Gullborg pin fittings and Zerk push type fittings manufactured and sold by plaintiff.

Early in 1933, the Lincoln Company decided to undertake the direct sale of its compressors to service stations and garages and took steps to create a distributing organization for such purpose. Prior to that time, for many years, practically all American-made automobiles had been equipped at their factories with pin fittings sold and manufactured by plaintiff under Gullborg or with push type fittings, manufactured and sold by plaintiff under Zerk. Hundreds of millions of these nipples were in the field, practically to the exclusion of anything else adapted to lubrication of automobile bearings. Consequently, the Lincoln Company, in order to sell its compressors, found it necessary to incorporate a terminal of such character as would connect with and co-operate satisfactorily with these Gullborg and Zerk nipples. As a result it brought out its N-1 needle type nozzles.

In April, 1933, plaintiff through its subsidiary the Alemite Corporation, put upon the market its new Alemite hydraulic system involving the combination now relied upon. Soon thereafter the Lincoln Company, in its advertising, claimed that its compressors could be used not only with Gullborg fittings and Zerk push type

nozzles but also with the headed nipple of the Alemite Corporation which plaintiff claims is protected by the Butler combination patent.

In July, 1934, Lincoln's advertising literature illustrated all three types of fittings as the various kinds of nipples with which the Lincoln compressor and nozzle were intended to be combined and used. Thus far, however, the Lincoln Company had not manufactured or sold any nipples of any kind for use in the lubrication of automobiles. But in the summer or early fall of 1934, after the Alemite system had been on the market for one and a half years, Lincoln entered upon negotiations with General Motors Corporation to sell to it in lieu of Alemite hydraulic fittings, theretofore manufactured and sold to it by plaintiff, a new fitting to be manufactured for the first time by Lincoln. The negotiators had under discussion round-headed and straight-sided nipples, without head, shoulder, or peripheral groove, not adapted for co-operation with the gripping jaws of the Alemite hydraulic coupler, but properly adapted for use in conjunction with the Lincoln N-1 nozzle and Lincoln Snap-On coupler.

No straight-sided nipples, other than a few samples, were manufactured or sold. On the other hand, Lincoln began to manufacture a peripherally grooved, shouldered, and headed nipple of form, size, and dimensions as to afford perfect co-operation with the gripping jaws of the Alemite hydraulic coupler. The first of these nipples were shipped to the Oldsmobile factory on November 24, 1934, and displaced the purchase and use of the Alemite fitting. Shortly thereafter, Cadillac, Buick, and Pontiac switched from the peripherally grooved and headed nipples of plaintiff to those of Lincoln. These branches of General Motors, however, except as to cars sold in foreign countries, included no purchase of couplers.

For eighteen months plaintiff had attempted to put its new coupler into the hands of every garage and service station in the United States. On April 1, 1935, 2,385,148 such couplers had been sold. It appears clearly that the sale of Lincoln Kleenseal fittings dates from the shipment made to Oldsmobile and that the fittings satisfactorily serve with plaintiff's compressor. Thus, the purchasers of automobiles from General Motors divisions could have their cars, equipped with Kleenseal

fittings, greased with the Alemite hydraulic compressors and couplers then in the hands of the service stations and garages through the country.

Mr. Fox, an engineer for Lincoln, became familiar with plaintiff's headed nipple shortly after its first appearance on the market in April, 1933. The automobile trade papers were, in that spring, summer, and fall, replete with advertisements and reading notices illustrating and describing every detail of plaintiff's hydraulic coupler, and Lincoln in July, 1934, illustrated in its circulars, Alemite headed nipples as being capable of combination with the Lincoln compressor. It is only a fair inference that during all of this period Lincoln, which seems to have been alert in its business, knew about and understood the Alemite compressor. At any rate, Mr. Fox admits that he became familiar with the coupler in January, 1935, and from that time on, Lincoln sold its peripherally grooved, shouldered, and headed nipples, adapted for satisfactory co-operation with the Alemite hydraulic compressor, with the knowledge that the purchasers of the Lincoln nipples could use them and would use them in conjunction and combination with the Alemite compressors and couplers. Furthermore, that company became familiar with the Alemite fittings immediately upon their appearance in April, 1933, and when the Lincoln nipples were first put on the market in November, 1934, they were in some thirty odd styles having arbitrary dimensions corresponding with those of the Alemite headed nipples and having their structure of such size, form, and dimensions as to make them completely interchangeable with Alemite nipples.

On April 17, 1935, a representative of plaintiff went to the place of business of Lincoln in Chicago and said to the man behind the counter that he wanted to purchase some nipples to be used with a gun which he then produced, an Alemite hydraulic compressor and coupler. The man produced Lincoln fittings. The witness tried them in co-operation with the gun and found that they co-operated with the Alemite compressor and coupler; purchased the fittings and took them away with him. He subsequently made other purchases of similar fittings for the same purpose. It thus appears in evidence that Lincoln sold the fittings upon the express understanding that they were to be used in combination with plaintiff's compressor



then exhibited to the salesman. At all times thereafter, Lincoln sold its peripherally grooved, headed, and shouldered fittings in commercial displacement of plaintiff's fittings with the knowledge and understanding that the Lincoln nipples thus sold could be used and would be used by the purchaser in conjunction with plaintiff's compressor and coupler part of the complete combination under the Butler patent.

This brings us, then, to the issue in this case; that of contributory infringement. If the combination of the Lincoln nipples with the plaintiff's hydraulic compressor and coupler embodies claim 2 of the Butler patent in suit and that claim is valid, then we have a clear case of contributory infringement.

The testimony shows a complete response of the combination of the Lincoln fittings and plaintiff's Alemite hydraulic compressor and coupler to claim 2 of the Butler patent. Every element included in claim 2 is included in such combination, and the demonstrations disclose that the co-operation and the functions thereof in this combination are the same as the combination of the plaintiff's compressor coupler, and fittings.

But defendant insists that claim is invalid. It relies largely upon the case of Stewart-Warner Corporation v. Jiffy Lubricator Co., 81 F. (2d) 786, 792 (C.C.A. 8). There the court held claim 1 of the Butler patent, while valid, not infringed by the Jiffy Company's sale of a certain coupler intended for use in conjunction with the cylindrically projecting end of an Alemite pin fitting. Claim 1 is not involved in this case. It included a fitting in the combination, and the claim is similar to claim 2, but the nipple is not headed. In the Jiffy Case, the nipple considered did not have head, throat, or shoulders. It was a perfectly smooth straight cylinder, and the Circuit Court of Appeals was of the opinion that the gripping action of the segmental jaws as disclosed in the Butler patent would not be sufficiently powerful to hold the coupler to such a plain, cylindrical nipple under the force of grease under pressure of several thousand pounds per square inch. The court said:

"But when we turn to the Butler patent specifications disclosing the 'means' he had in mind for 'compressively engaging about the nipple for locking said parts together,' we find no reference to any elements cor-

responding to such positive wedging means as above described. He describes a nipple having a head, a throat, and a shoulder, and segments adapted to slip over the head of such a nipple and embrace the throat thereof. Then he specifies spring fingers mounted on the forward face of the piston. Ample room is left in the cylinder for the free play of the spring fingers. As the piston is moved forward by the pressure of the lubricant, the spring fingers do engage and press upon the segments so that the segments are pressed upon the throat of the nipple. But the nipple is not specified to be held against longitudinal displacement by the force of the gripping. The language of the specifications is that the segments are held in position on the throat by the spring fingers, but it is the 'shoulder' on the nipple which 'prevents the retraction of the segments' or pulling away from the nipple. We conclude from consideration of all the specifications and the drawing that the inventor excluded disclosure of elements which would be actuated by the forward movement of the piston to lock the coupler to the nipple by any unyielding wedging action, but that he disclosed only such a yielding compression as should be accomplished by spring fingers.

"We find the difference between the Butler patent and the Jiffy coupler substantial, in that the mechanical or engineering principle on which the Butler patent compresses the jaws of its chuck about the bearing nipple is different from that relied upon in the Jiffy structure. As they are not mechanical equivalents and as it does not appear that Butler invented or disclosed such a chuck as that made by Jiffy, there was no infringement."

Consequently, the opinion is of no aid in the decision of this case. Here we are dealing with a nipple of the character described by Butler in claim 2, with a head, a throat, and a shoulder. The coupler incorporates segments adapted to slip over the head of such a nipple and embrace or grasp the throat thereof. It is the shoulder on the nipple which prevents the retraction of the segments. The nipple discussed in the Jiffy Case, as the court pointed out, was not of such construction. It would not prevent longitudinal displacement by the force of the gripping of a compressor of Butler's type, although it would co-operate with the Jiffy compressor held not to infringe. It did not have the shoulder which prevents retraction of the

segments or the pulling away from the nipple. Lincoln sells a headed nipple, to be substituted for the plaintiff's headed nipple. It has a head, a throat, and shoulders, and when used in conjunction with the Alemite hydraulic coupler, the segments of the coupler slip over the head of the defendant's nipple and embrace the throat thereof and clutch the head within the meaning of Butler's specifications and claims.

Defendant insists that this case is controlled by the recent decisions of the Supreme Court in *Bassick Manufacturing Company v. R. M. Hollingshead Company* (G. S. Rogers et al. v. Alemite Corporation), 56 S.Ct. 787, 80 L.Ed. —, and it becomes necessary to examine those decisions with some care.

These cases went to the Supreme Court when the Gullborg patent was about to expire. The question of validity of the patents involved had been raised in many District Courts and the patents held valid and infringed in various Circuit Courts of Appeals. Unfortunately, the record was rather short. Plaintiff in the Hollingshead Case offered in evidence a sample of defendant's device and relied upon physical demonstration to show that uncoupling involved the suction effect of Gullborg.

From a decree finding infringement in the sale of the compressor and coupler of the type complained of, the Hollingshead Company appealed and argued that the device complained of had no suction effect. The Circuit Court of Appeals affirmed, 73 F.(2d) 543 (C.C.A.6). The Supreme Court took jurisdiction, and the question presented was as to the validity of the Gullborg patent, and whether the device complained of utilized the suction effect of the Gullborg claims. The Supreme Court held the claims valid, but said that the suction effect construction had not been proved and that the accused device did not involve the novel feature claimed in the patent. Clearly the case was determined upon a question of fact and the decision is of no help here, except in so far as it implies that if the device had been shown to be of the suction effect type, its manufacture and sale would have been held to constitute contributory infringement.

The language of the opinion indicates no intention to upset or to reverse anything that had been previously announced

as to the character of a combination patent. Such an invention is defined by Mr. Justice McKenna in *Leeds & Catlin Co. v. Victor Talking Machine Co.*, 213 U.S. 325, at page 332, 29 S.Ct. 503, 505, 53 L. Ed. 816, as follows: "A combination is a composition of elements, some of which may be old and others new, or all old or all new. It is, however, the combination that is the invention, and is as much a unit in contemplation of law as a single or noncomposite instrument. Whoever uses it without permission is an infringer of it. Whoever contributes to such use is an infringer of it. It may be well here to get rid of a misleading consideration. It can make no difference as to the infringement or noninfringement of a combination that one of its elements or all of its elements are unpatented."

In the companion case of *Leeds & Catlin Co. v. Victor Talking Machine Co.*, 213 U.S. 301, at page 318, 29 S.Ct. 495, 500, 53 L.Ed. 805, he said:

"A combination is a union of elements which may be partly old and partly new, or wholly old or wholly new. But, whether new or old, the combination is a means—an invention—distinct from them. They, if new, may be inventions and the proper subjects of patents, or they may be covered by claims in the same patent with the combination.

"But whether put in the same patent with the combination or made the subjects of separate patents, they are not identical, with the combination. To become that they must be united under the same co-operative law. Certainly, one element is not the combination, nor in any proper sense, can it be regarded as a substantive part of the invention represented by the combination, and it can make no difference whether the element was always free or becomes free by the expiration of a prior patent, foreign or domestic. In making a combination, an inventor has the whole field of mechanics to draw from. This view is in accordance with the principles of patent laws. It is in accordance with the policy of § 4887 of the Revised Statutes, which is urged against it."

I find nothing in the Hollingshead Case that purports in any way to disturb the previous announcements of the Supreme Court. Rather, it seems to me, the court reaffirms its adherence to its former holding.

[1-3] It is well to observe that there are three classes of combination patents as follows:

- (1) One or more old elements, plus one or more new elements.
- (2) A plurality of elements, all of which are old.
- (3) A plurality of elements, all of which are new.

Obviously to any trial judge, in their final analyses, almost all patentable combinations are of the second class; namely, those in which all of the elements are of themselves old. The old elements in a new valid combination, as the Supreme Court says, constitute invention and are as much a unit in contemplation of the law as a single or noncomposite instrument. There is no one element that can be said to be the gist of the combination, but it is the co-operative, co-ordinating, unified result, wherein the various elements contribute to one unitary result, which constitutes invention. It is misleading, therefore, to speak of any one element as the essence of the invention. Thus, in *Automotive Parts Co. v. Wisconsin Axle Co.*, 31 F. (2d) 125, at page 126 (C.C.A.6), the court said: "The invention is for a composite thing, embracing several elements or parts, all of which are necessary to and co-operate in the operation of the patented unit. We cannot subscribe to the view that the test of contributory infringement in the furnishing of parts for a combination invention is whether the parts furnished constitute the gist or essence of the invention; indeed, we cannot see how it may be said that any one element or another marks the advance step or is the essence of such an invention. There are cases, it is true, in which the phrase 'essence of the invention' is used; but in our view, when the facts in those cases are considered, it cannot be said that the conclusions reached were the result of a logical selection of one or more elements of the combination as the gist or essence of the invention."

And the Supreme Court said in *Leeds & Catlin Co. v. Victor Talking Machine Co.*, 213 U.S. 301, 29 S.Ct. 495, 530, 53 L. Ed. 905, "Certainly, one element is not the combination, nor, in any proper sense, can it be regarded as a substantive part of the invention represented by the combination."

The word "substantive" means "an essential part" or "constituent" or "relating to what is essential."

[4] The question, of course, always, is whether there is a new patentable combination which produces a new and unitary result. The operation and functioning of all of the old elements of the new combination must be affected by their presence in the new combination and each part must contribute its part to the unitary whole. Otherwise, we have an unpatentable aggregation. But if the operation or functioning of each of the old elements is in some way affected by its presence in the new combination in such a way as to contribute to the accomplishment of a new and unitary result, then we have a valid patent claim.

In the *Rogers Case*, apparently, in the District Court the trial revolved about the question of whether the defendant sold its products with the knowledge that they would be used in conjunction with the parts sold by plaintiff. But in the Supreme Court this question of fact was abandoned and the defendant's contentions were that Gullborg patent was invalid and that the plaintiff was illegally extending its monopoly. The court held that the plaintiff might not extend the monopoly of its patent. But we do not understand that the decision in any way sought to review any prior announcement of the Supreme Court upon the subject of contributory infringement. The court did not so expressly hold, and I find in the opinion no such implication.

However, the court held that the evidence was that the prior art embraced the use in combination of a grease gun composed of a chamber or pump, a hose, a hose coupler, and a spring-closed fitting, the coupling being of the pin and slot or bayonet type. This prior art arose from Gullborg's earlier patent, No. 1,307,733, and the Seng-French patent, No. 463,869. The court observed that the plaintiff's position was that when defendant furnished a gun, a part of this old unpatented and unpatentable combination, for use with the pin fitting of Gullborg, No. 1,307,733, it contributorily infringed claims 14 and 15 of the patent in suit, because those claims describe the combination of any grease gun with the patented pin fittings. For the invention of his fitting, Gullborg had previously applied for and obtained a patent, No. 1,307,733, not then in suit. Claim 15 of the Gullborg patent then in suit described a combination consisting of the pin fitting of Gullborg's patent, No. 1,307,733, with any grease pump having a bayonet type



coupler. The court said that the question then, was whether claims 14 and 15, unless restricted to the combination of a grease gun and coupler and a pin fitting such as are described in the specifications of the patent, are void as attempting to extend Gullborg patent, No. 1,307,733, to the use therewith of any grease gun not having the suction device of the patent in suit. It held that though claims 14 and 15 are for a combination using a device of a prior patent, with grease gun or coupler of any type, they must be read as claiming only a combination of pin fittings and a gun, with coupling device having the suction effect set forth in Gullborg's patent; otherwise, the claims would be void as unlawful attempts to extend the monopoly of the pin fitting in patent 1,307,733.

The court observes that Rogers neither made nor sold pin fittings of the type covered by Gullborg, No. 1,307,733, and observed that the question was whether the patentee might further claim the combination between the patented pin fittings and any form of grease gun. He would thereby in effect be repatenting the old combination by reclaiming it with the improved element substituted for the old element. This the court said could not be done.

The thought underlying the court's remarks was that except for the suction-effect coupler combination, Gullborg had made but one invention; namely, his particular form of pin fitting; that his right to patent protection had been exhausted in his patent 1,307,733; and that he could not be permitted to extend the monopoly of this old patent. The court, in effect, reaffirmed *Leeds & Catlin Co. v. Victor Talking Machine Co.*, 213 U.S. 301, 325, 29 S.Ct. 495, 53 L.Ed. 805.

The rather startling feature of the Supreme Court's opinion is the announcement that the Leeds Case patent to Berliner, No. 534,543, was a pioneer patent. I consider this unimportant, because evidently the Supreme Court has extended, intentionally or otherwise, the meaning of the word "pioneer," for in the Leeds Case the two earlier patents, 372,786 and 332,790, described and claimed substantially everything in Berliner, 534,543, then being considered, in the way of disc, record, cabinet, and record in phonograph machines. There was an improvement, however, which I shall later discuss. As a matter of fact, the original phonograph goes back to Edison's patent in 1878. Many other

delvers in the art have procured patents since then, but Bell and Tainter, No. 341,214, includes most of the prior art. As compared with that, the Berliner invention consisted in permitting the stylus of the reproducer to be propelled by and along the sound groove of the record tablet all the way from its outer circumference to its inner end. To accomplish this, it made use of a mounting for the reproducer which would permit it to travel freely throughout this distance. Berliner's invention resided in giving the reproducer a greater degree of freedom of movement to follow the groove in the record, and, by doing so, eliminating the necessity of providing means for relatively shifting the record and reproducer. The new thing was the unrestricted pivotal mounting. This was pointed out by Judge Hazel in the trial court (*Victor Talking Machine Co. v. American Graphophone Co.* [C.C.] 140 F. 890) and by Judge Hough in the Circuit Court of Appeals in *Leeds & Catlin Co. v. Victor Talking Machine Co.*, 154 F. 58, 23 L.R.A.(N.S.) 1027. Consequently, the statement of the Supreme Court in the Leeds "(Rogers?)" Case that the patent "(in the Leeds case)" was a pioneer must be taken into consideration with the record disclosing its place in the history of the art.

In *Leeds & Catlin Co. v. Victor Talking Machine Co.*, 213 U.S. 301, 311, 29 S.Ct. 495, 53 L.Ed. 805, the court had to do with a combination consisting of the elements: (1) A traveling disc having a sound record formed thereon; (2) a reproducing stylus, shaped for engagement with the record and free to be vibrated and propelled by it. It was, therefore, a true mechanical combination device, producing by the co-operation of its constituents the result specified in the manner specified. The Leeds records were equally suitable for use in connection with the Victor machine as well as their own machines. The court held that there was contributory infringement.

The result was in general the old result of producing or reproducing articulate sounds. But the new and unitary result was the production of articulate sounds by the automatic swing of the stylus across the disc record; in this respect only the patent was a pioneer. Everything else was old. The new thing was the pivot or hinge for the stylus so that it might be propelled by the record all the way across the face of the record. The various elements pos-

posed no utility without co-operation in combination. Each element was necessary to the operation of the whole.

From an examination of the Leeds opinion I believe(d) that the basis of the decision relative to the Gullborg patent was that this inventor of (the) pin fitting, part of the complete combination, part of which had already been separately patented, did not bring about any new mode of operation or co-operation in or among the other elements thereof. It did not alter or modify or give new functions to any of the other parts of the combination; and, therefore, the old parts did not participate in a new way in the accomplishment of a new and unitary result. As pointed out by Judge Thatcher in the District Court in *Bassick Mfg. Co. v. Adams Grease Gun Corporation* 39 F.(2d) 904, 905, in discussing the Gullborg patent, where he says: "The novelty in Gullborg's fitting was merely in the use of the same pin to furnish bearings for the slot and an abutment for the spring, and it was only this specific form of construction which was patentable. *Lyman Mfg. Co. v. Bassick Mfg. Co.* (C. C.A.) 18 F.(2d) 29. Thus it will be seen that there was no functional novelty in combining such a pin fitting with a bayonet coupler and a grease gun. The old combination of the gun, the bayonet coupler, and a pin fitting with ball and spring valve would work as well and accomplish precisely the same result. To extend the combination claims to cover the use of any old gun and any old coupler on a Gullborg fitting is clearly not permissible in view of the prior art, which limits novelty in the pin fitting to a specific form of construction and deprives the aggregation of elements of all patentable novelty as a combination. Whether its elements be old or new a combination is an invention distinct from them."

The ground for decision appearing in these opinions is not applicable to the Butler patent, claim 2. Here the question is whether Butler produced a combination which achieved a new and unitary result by the co-operation of all the elements, whether all the elements have new or modified functions as a result of changes or substitutions, or whether the old elements have only the old functions operating and co-operating in the old way to produce only an old result. We have seen that the combination consists of seven elements, all of which are old; that invention arises not from any one element, but from the

new unitary result. Defendant insists that the essence of the combination is the coupler, but we have seen this is a fallacious theory, for if it were correct and available to secure the use of the nipple to co-operate in the combination, one person might make the nipple, another the cylinder; another a group of jaws, another the sealing seat; another the piston. Each of these are old; each of them sell separately. The purchaser could quickly assemble them and then claim that each part had an independent status apart from that in the Butler combination. There could then be no infringement.

The headed nipple, which co-operates with the sealing seat and jaws of the coupler and thus with the piston and cylinder, is just as essential a part of the Butler invention as any of the several elements of the coupler. There is co-operation between the nipple and the jaws which produces the operation of the seal, which in turn effectuates the operation of the gripping jaws, making possible heretofore unachieved pressures. The headed nipple has new functions arising out of direct co-operation with the jaws. The head spreads the jaws of the coupler when the latter is attached and thus prepares the coupler for operation in bringing about a mechanically strong and lubricant tight joint. In detaching the coupler the head of the nipple engages and pushes the jaws outwardly. These in turn push the piston backward, thereby effecting the release of the coupler from the nipple. The presence and the action of the nipple are essential, because the nipple alone makes it possible to build up in the cylinder of the coupler a grease pressure which will force the jaws into gripping enforcement with the nipple. The nipple is not merely a receptacle. It becomes an element which coacts to influence and make possible the desired operation of the coupler mechanism.

Butler was the first to utilize a headed nipple and a compressor as co-operating elements of a combination whereby a grease-tight and mechanically strong connection between compressor and bearing were effected automatically in and by the grease pumping operation of the compressor alone.

The high pressure delivery of grease from the compressor to the interior of the bearing, due to the strong and grease-tight attachment of the grease gun to the grease passageway of the bearing, was a new,

useful, and unitary result. It could not be accomplished with anything less than the combination of all of the elements included in Butler. Each part of the combination performed new functions and operated and co-operated in new ways in order to accomplish the single new result. The invention of Butler resides in the combination and not in one specific element. Every one of the seven old elements' functions became essential factors in the new combination. The situation is not one where the language of the Supreme Court in the Gullborg Case (56 S.Ct. 787, 791, 80 L.Ed. —) is applicable, for in the sense that the Supreme Court used the term pioneer, Butler is equally a pioneer. A completely new unitary result is achieved; something never accomplished before. Just as the Supreme Court said of the Berliner patent, "each element was necessary to the operation of the other."

What has been said with reference to the Hollingshead and Rogers Cases is equally applicable to the recent decision of Judge Schoonmaker in Stewart-Warner v. Rogers, and Stewart-Warner v. Universal Lubricating System, Inc., 15 F.Supp. 410, in the District Court for the Western District of Pennsylvania.

Defendant insists that the history of file wrapper is fatal to Butler's claim in view of the fact that the third claim was canceled and that the present claim construed as contended by plaintiff is equivalent to the rejected claim. I do not believe such result follows, for the plaintiff is not asking to have claim 2 interpreted or construed in such way as to include the mechanism of canceled claim 3. There is no estoppel as contended.

Defendant argues that to decree this combination valid is to deprive prior patentees of valid old elements included in the combination of their rights and to limit them and their uses. But we believe that the complaint is not well founded. Defendant is free to make and use the old articles for use in the old manner taught by the prior art, but when these old elements are included in the new combination, achieving a new and unitary result, we may not deny validity; "then, indeed, the protection which is promised by the constitution and laws of the United States to inventors is a poor sham. Many of the most valuable patents are combinations of nonpatentable elements, and the only effective mode of preventing infringement is by suits against those who, by furnishing

the parts which distinguish the combination, make it possible for others to assemble and use the combination, and who, by advertisement of the sale of such parts and otherwise, intentionally solicit and promote such invasions of the patentee's rights." Thomson-Houston Electric Co. v. Ohio Brass Co., 80 F. 712, 721 (C.C.A. 6), opinion by Judge Taft.

Defendant argues at length that the sealing mechanism of Butler is not in combination with the gripping mechanism but constitutes mere aggregation. It is to be observed, however, that the operation of the gripping mechanism is absolutely dependent upon the operation of the sealing mechanism and that the operation of the latter is dependent upon the operation of the former. Each is dependent upon the other. Functioning in co-operation and co-ordination is necessary to produce the desired result. This is not aggregation.

A great deal of attention has been given to the argument that the Butler invention must be limited to a flimsy spring finger between the piston and the jaws of the coupler. Irrespective of the decision of the Circuit Court of Appeals for the Eighth Circuit (Stewart-Warner Corporation v. Jiffy Lubricator Co., 81 F.(2d) 786), the record of which is not before us, it is sufficient to say that the evidence here presented discloses clearly that the operability of the Butler invention was not dependent upon any particular degree of springiness; that the device will operate satisfactorily to accomplish all the results described by Butler, if the piston is rigid or very springy, or only slightly so. Furthermore, there is nothing in the claim of the Butler invention which does not apply to the rigid assembly of Butler's original device, in evidence, in the same manner as it applies to the flexible sample made and produced by defendant. Butler in no place makes any claim which recognizes as essential this factor. I cannot read into claim 2 any requirement of springiness or spring fingers.

Defendant cites certain prior art. Newton patent, No. 1,118,876, discloses a device for use in testing under pressures of 100 or 150 pounds per square inch the air brake hose couplings of cars in railroad trains. It includes no beaded nipple, lubricant compressor, aperture for discharging grease, apertured sealing seat carried by a piston for engagement with the nipple, and nothing whereby the pres-



sure of the lubricant on the piston will move the said element to compress forcibly while the lubricant is passing through the connecting parts. It teaches nothing of what Butler achieved. The modified structure produced by the defendant I believe does not follow the teaching of Newton. It is impractical for Newton's purposes, and does not teach what Butler taught.

Defendant insists that Lincoln cannot contributorily infringe the Butler patent because plaintiff's coupler part is not constructed according to the Butler patent, and claim 2 does not properly cover plaintiff's hydraulic apparatus. I believe the premises are not well founded, but that plaintiff's construction follows the teaching of claim 2.

[5] Defendant contends that nonuse of Butler device for some time renders the patent therefor subject to a strict construction, and that it should be construed so that it will not be infringed by Kleen-seal fittings. It seems that Butler did not manufacture under his patent for two or three years, but immediately upon the purchase of the patent, plaintiff began to manufacture under the same and put its product into the widest possible commercial use, and such use has grown to the extent that the combination is used on 99 per cent. of the automobiles made and sold in America. This success had been attained a year prior to the commencement of manufacture and sale of the nipple of defendant. There is no legal reason why, when commercial success has resulted and a late infringer seeks to defend, he should be allowed to say that the patent is limited in some way because in the first two or three years of its life no manufacture took place. There is estoppel where defendant did not begin its manufacture until after commercial success had been achieved by the new owner of the patent.

Defendant contends that its nipples may be used in association with compressors and nozzles other than those of the Butler patent. To my mind this is an unimportant fact. The round-headed and straight-sided nipple which defendant first

designed could be used with all of these other compressors, but could not be used with devices built in accord with Butler. When defendant changed from a noninfringing device which it could use with other nozzles, to infringing devices which could be used and were intended to be used in combination with plaintiff's couplers, it began its infringement.

As Walker on Patents (6th Ed.) p. 554, said:

"But where the machine or other property thus furnished, is useful for some other purpose than to be a part of a patented combination, or to make a patented article, or to be operated upon by a patented machine, or to be used in performing a patented process, and where he who furnishes the property, does not intend or know, when furnishing the same, that it is to be thus used, he incurs no liability to an action for infringement.

"But if he knew or intended that the property furnished by him was to be used in either of the infringing ways, he cannot defeat an action for infringement, by showing that the furnished property could have been used in some non-infringing way.

"In the absence of specific proof of knowledge or intent, the fact that the property furnished could be used with an article or machine which in itself could not be an infringement and that there are many such articles or machines in use is sufficient to absolve one who supplies such property from the charge of infringement."

[6] I conclude, therefore, that claim 2 is a valid patentable combination; that the defendant's fittings sold, with the knowledge and understanding that the same were to be used in co-operation with the Alemite compressor, are a contributory infringement, and that there is nothing in defendant's contentions to avert the resulting consequences.

The findings of fact and conclusions of law incorporated herein will be included in my formal findings and conclusions adopted this date.

IN THE  
DISTRICT COURT OF THE UNITED STATES

FOR THE NORTHERN DISTRICT OF ILLINOIS,  
EASTERN DIVISION.

STEWART-WARNER CORPORATION,  
*Plaintiff.*

vs.

LEVALLY, ET AL.,  
*Defendants.*

FINDINGS OF FACT AND CONCLUSIONS OF LAW.

I find the facts to be as follows:

(1) Plaintiff is a Virginia corporation and is the owner of the Butler patent No. 1,593,791, and of all rights thereunder.

(2) Defendant Lincoln Engineering Company of Illinois is the distributor for the Chicago territory of lubricating apparatus manufactured by the Lincoln Engineering Company of St. Louis, Missouri, a Missouri corporation.

(3) The defense of this suit is being conducted by and under the control of Lincoln Engineering Company of St. Louis, Missouri, a Missouri corporation.

(4) The Butler patent in suit No. 1,593,791 illustrates, describes, and claims lubricating apparatus in which a headed or shoulder d nipple or fitting is provided for attachment to each bearing of an automobile or other machine to be supplied with lubricant from a lubricant compressor or pump by successively attaching to the nipple, a coupler with which the nipple cooperates to make a lubricant-tight connection by engagement against the end of the nipple, and which coupler has jaws engageable about the throat of the nipple automatically to grip the nipple when the compressor is operated in the customary way to deliver lubricant to a bearing. The tightness of the seal effected between the nipple and the coupler, and the tightness of the grip between the nipple and the coupler, are increased proportionately with increases in the pressure of the lubricant being supplied to the bearing.

(5) In practical operation grease pressures running up to thousands of pounds per square inch are frequently required in order to force the grease into the interstices of a bearing.

(6) When the compressor is operated to inject grease under these high pressures, the tendency is to burst the compressor, coupler and the nipple, and to break open the con-

nection between the coupler and the nipple by forcing these parts asunder.

(7) Because of the tremendous pressures which must be developed in a lubricating system, it is important in order to prevent leakage of lubricant to secure the maximum tightness of seal and the maximum mechanical grip. Both the strength of the grip and the tightness of the seal must be proportional to the pressure of the grease to be transmitted. If the seal is not sufficiently tight, the grease will escape,—and the requisite pressure cannot be developed. If the grip is not sufficiently strong, the parts will be forced asunder.

(8) In the Butler combination the automatic end seal and the automatic grip both become more effective as the lubricant pressure increases and the need for a more effective seal and grip becomes greater.

(9) In the Butler patent the end seal member is moveable and thus may adjust itself to fittings of slightly different dimensions.

605 (10) Any resiliency in part 42, referred to in the Butler patent as constituting "spring fingers," serves the purpose of compensating for any slight out-of-roundness of the fitting.

(11) Butler, applicant for the patent in suit, presented to his solicitors for the purpose of preparing the application for the patent in suit, a sample device including a coupler, the jaws of which were forced into clamping engagement with the nipple by a relatively rigid, hollow cylindrical part, corresponding exactly to the disclosure in Fig. 2 of the Butler patent here in suit. Claim 2 of the patent describes this early sample of the invention.

(12) Butler was the first to propose or to devise a lubricating system in which the sealing of the joint between the end of the nipple and the coupler, and the mechanical grip between the nipple and the coupler, were effected automatically by the pressure of the lubricant in and by the normal pumping operation of the compressor.

(13) Claim 2 of the Butler patent describes in more or less detail, a combination of seven elements which may be enumerated as nipple, compressor, cylinder, piston, aperture, jaws, and sealing seat. Each and all of these parts cooperate with one another in new ways in the accomplishment of a new and unitary result.

(14) Prior to manufacturing and selling the Alëmite Hy-

draulic system of the patent in suit (exemplified in Plaintiff's Exhibits 13 to 20 and 22 to 25, inclusive) plaintiff sold lubricating apparatus (Plaintiff's Exhibits 9 and 12) of the types illustrated in Gullborg patent No. 1,307,734 and Zerk patent No. 1,475,980.

606 (15) Plaintiff commenced selling the Alemite Hydraulic lubricating equipment exemplified in Plaintiff's Exhibits 13 to 20 and 22 to 25, inclusive, in April, 1933.

(16) Plaintiff sold 281,555,000 of the Alemite Hydraulic fitting parts of the combination during the period from April, 1933, to March, 1936, and during this same period sold 6,306,000 of the Alemite Hydraulic coupler parts thereof.

(17) Of the 6,306,000 Alemite Hydraulic coupler parts sold during the period from April, 1933, to March, 1936, approximately 4,485,000 were sold with their associated compressors to automobile manufacturers, to be put in the tool kits of the cars at the factory.

(18) The Alemite Hydraulic lubricating equipment embodying the invention of the patent in suit rapidly superseded the Gullborg and the Zerk lubricating equipment because:

(a) Under this equipment, it was not necessary to manipulate any coupler mechanism in the operation of attaching and detaching the coupler to and from the fitting,—as was necessary in effecting a connection between a Gullborg coupler and fitting, and

(b) It was not necessary for the user to apply force to hold the coupler against the fitting to prevent separation of these parts,—as was required in effecting a connection between the coupling nozzle and fitting of the Zerk lubricating system.

Within eight months after its introduction on the market, the plaintiff's Alemite Hydraulic system had been adopted as the factory lubricating equipment of every automobile and truck made in the United States, with the single exception of the Duesenberg.

607 (19) The mechanism embodied in the means by which the jaws are compressed about the nipple of the Alemite Hydraulic system, is identical in its mechanical principles with that disclosed in the Butler patent. It is a simple equivalent involving a mere reversal of parts.

(20) The Alemite Hydraulic system comprises the combination of elements set forth in claim 2 of the Butler patent.



(21) The Lincoln Engineering Company of Missouri initially engaged in the business of making and selling automobile lubricating equipment in 1925, supplying its equipment exclusively to plaintiff. This relationship between the Lincoln Company and the plaintiff continued for several years thereafter, until 1933.

(22) When, shortly after January 1, 1933, Lincoln Engineering Company began selling automobile lubricating apparatus to others than Alemite, the sales of such apparatus, equipped with couplers or nozzles of its own manufacture, were made with the knowledge and expectation that the purchasers would use the apparatus in combination and conjunction with Alemite fittings.

(23) In May, 1933, Mr. A. P. Fox, the vice-president and designing engineer of Lincoln Engineering Company of Missouri, became familiar with the nipple parts of the Alemite Hydraulic system. Although he had known of the compressor and coupler parts at an earlier date, he became familiar with them at least as early as January, 1935.

(24) The Lincoln Company's Kleenseal nipples were thereafter sold with the knowledge that they could be substituted for the plaintiff's nipple part of the Alemite Hydraulic combination, and that they would be so combined in use. Claim 2 applies to the combination in the same way, regardless whether it incorporates the Lincoln Company's Kleenseal nipple part or the plaintiff's nipple part.

608 (25) The dimensions of the Lincoln Kleenseal fitting are exactly such as to make it cooperate satisfactorily with an Alemite Hydraulic coupler. If the dimensions selected had been slightly different, such cooperation would have been impossible. Similar fittings of slightly different dimensions would have had all other utilities which have been ascribed to the Lincoln Company's fittings, and would have cost no more to make.

(26) The defendants John R. LeVally and Frederick A. Faville did not, as individuals, either jointly or severally, sell any Lincoln Kleenseal fittings.

(27) Defendants sold "Lincoln Kleenseal" fittings with the knowledge that they were to be used in combination with the compressor and coupler parts of the Butler combination as sold by the plaintiff for use with plaintiff's Alemite Hydraulic coupler equipped grease guns.

(28) The Lincoln Engineering Company of Missouri ex-

pected that automobiles equipped with the Lincoln nipple part of the combination and sold in the United States, would be lubricated at garages and service stations. The plaintiff had previously sold millions of the compressors and coupler parts of the combination, and had endeavored to supply every public garage and service station in the United States.

(29) The Lincoln Engineering Company of Missouri in its Kleenseal fittings, duplicated, fitting for fitting, all of the arbitrary dimensions of the entire line of Alemite Hydraulic fittings.

(30) The Lincoln Engineering Company did not sell any of its grease guns or nozzles to automobile manufacturers for tool kit equipment of automobiles sold in the United States, even though the automobiles were equipped with Lincoln Kleenseal fittings.

609 (31) There is nothing in the Butler patent which requires the use of spring fingers which can yield a substantial amount.

(32) The Lincoln Engineering Company initially submitted to the Standards Division of General Motors Corporation a fitting like the Kleenseal fitting, but without the peripheral groove or shoulder or head. But General Motors never purchased these ungrooved fittings. Instead, it purchased the Kleenseal fittings having the groove, and cooperable with Alemite Hydraulic couplers.

(33) The Alemite Hydraulic coupler will grip and form a sealed connection with a Lincoln Kleenseal fitting as well as with an Alemite Hydraulic fitting and claim 2 of the Butler patent describes one combination as well as the other.

(34) Defendant's model of Fig. 2 of the Butler patent does not accurately or fairly represent the invention of Butler.

(35) Defendants' Exhibit A-61 does not correspond to the alleged drawing thereof. Defendants' Exhibit C-21.

(36) Defendants' expert, stated, that none of the prior art except Winkley Reissue Patent No. 14,667 accomplishes the results obtained by the Butler patent.

(37) The Winkley Reissue patent No. 14,667 does not disclose the radially movable locking elements, the piston, or the means actuated by the piston for compressively clutching the locking elements upon the nipple, as Butler's invention is defined in claim 2 of his patent. The Winkley patent discloses a coupler having a spring pressed sealing member. It is not in any way analogous to the combination of elements defined in Butler's claim 2.

610 (38) The particular shape of the oil cup shown in the Richardson patent No. 8,251 has no significance of functional utility.

(39) The patents to Paul No. 621,276, Ulleland No. 1,253,309, and Pinel French No. 327,557, each discloses a construction readily distinguishable from that claimed by Butler in that in each of these prior art patents the locking elements are not actuated by any piston nor automatically by the pressure of the grease.

(40) The patent to Newton No. 1,118,876 discloses a train hose testing appliance which was never intended to be used for high pressure lubrication and could not be used for such purpose without making a great many alterations of an inventive character in its construction. It does not embody the combination of Claim 2 of the Butler patent.

(41) Defendants' representation, Exhibit A-68, differs in many material respects from the disclosure of the Newton patent No. 1,118,876, but even with all of the changes which have been incorporated in it in an endeavor to make it work, it is not a commercially feasible or practically operative device for high pressure lubrication.

My conclusions of law are as follows:

(1) This Court has jurisdiction of this suit and of all of the parties thereto.

(2) The Lincoln Engineering Company of Missouri is bound by the decree herein.

(3) Defendants John R. LeVally and Frederick A. Faville did not, as individuals, either jointly or severally, infringe claim 2 of the Butler patent, and the bill of complaint should be dismissed as to these parties.

(4) Claim 2 of the Butler patent No. 1,593,791 describes a new and useful improvement in lubricating apparatus. 611 The combinations of elements set forth in this claim are not anticipated by any combination disclosed in any patent, publication, or prior use antedating the application for the Butler patent.

(5) Butler was the first to have invented the combination set forth in claim 2 of his patent No. 1,593,791.

(6) The Butler patent contains an adequate disclosure of a novel form of lubricating apparatus which could be made and used for the intended purpose by a mechanic skilled in the art of making lubricating apparatus.

(7) All of the parts of the lubricating system invented by Butler and disclosed in his patent, cooperate in a novel man-

ner to produce a new and unitary result. Each part is dependent upon the other for the performance of its functions, and each part performs new functions because of the presence and cooperation of the other parts.

(8) Claim 2 of the Butler patent No. 1,593,791 is valid.

(9) Defendants have contributorily infringed claim 2 of the Butler patent by their sales of Kleenseal nipples or fittings exemplified in Plaintiff's Exhibits 27a and 27b.

(10) Plaintiff is entitled to a writ of permanent injunction enjoining and restraining the defendant Lincoln Engineering Company of Illinois, its officers, agents, employees, associates and confederates, from making, using, and selling lubricating apparatus, particularly fittings of the kind exemplified in Plaintiff's Exhibits 27a and 27b, or any other device or devices embodying the invention of claim 2 of Butler patent No. 1,593,791, or any of the parts thereof, or any of the coupler or fitting parts adapted and intended to be used in combinations embodying the invention of said patent, and from offering or advertising so to do, and from aiding or abetting, or in 612 any way contributing to the infringement of said patent.

(11) Plaintiff is entitled to recover from the defendants the profits which said defendants have made, and the damages which plaintiff has suffered by reason of the said defendants' infringement of the Butler patent in suit, and to recover its costs and disbursements of this proceeding, in accordance with the statutes and rules in such cases made and provided.

I adopt as a part of these findings and conclusions of law and incorporate herein as a part hereof by reference all findings and conclusions of law included in my memorandum opinion entered as of even date hereof.

Entered this \_\_\_\_\_ day of July, A. D. 1936.

Walter C. Lindley,  
Judge.

Filed July 15, 1936.



**STEWART-WARNER CORPORATION  
v. LEVALLY et al.**

**No. 13955.**

District Court, N. D. Illinois, E. D.

Oct. 5, 1936.

**1. Equity ⇐392**

Practice of rearguing issues previously determined in petition for rehearing is not to be encouraged.

**2. Patents ⇐315**

In patent infringement suit, reasonable diligence before hearing in procuring evidence offered as newly discovered, as ground for rehearing, *held* not shown, where such evidence consisted of statements made to Patent Office in course of solicitation of another patent which were available before trial.

**3. Equity ⇐392**

Trial court cannot consider evidence on rehearing which could have been discovered with reasonable diligence before trial.

**4. Patents ⇐315**

New evidence must be material or helpful in determining issues to constitute ground for granting rehearing in patent infringement suit.



# 1. Patents $\Rightarrow$ 315

Statements of counsel for plaintiff who prevailed in patent infringement suit as solicitors for another patent which were proffered as newly discovered material evidence, held not to warrant a rehearing.

# 2. Patents $\Rightarrow$ 26(1)

New combination involving only a variation in method of reducing original idea to practice, or which varies idea of means without changing essential character, or giving substantial increase to practical efficiency, is mere change of form, not constituting invention.

# 7. Patents $\Rightarrow$ 19

Change indicating introduction into the idea of means of a different force, a different object, or a different mode of application, is a separate invention.

# 2. Patents $\Rightarrow$ 316

Decree enjoining manufacture and sale of nipple contributorily infringing patent beyond limits of United States held too broad and would be limited to operation within United States.

On petition for rehearing.

Rehearing denied, original decree vacated, and decree rendered in conformity with opinion.

For former opinion, see 15 F. Supp. 571.

Williams, Bradbury, McCaleb & Hinkle, of Chicago, Ill., for plaintiff.

Wilkinson, Huxley, Byron & Knight, of Chicago, Ill., Delos G. Haynes and Lloyd R. Koenig, both of St. Louis, Mo., and Leonard L. Kallish, of Philadelphia, Pa., for defendants.

LINDLEY, District Judge.

Subsequent to the entry of decree herein, defendant Lincoln Engineering Company of Illinois filed its petition for rehearing, supported by affidavits and exhibits. Plaintiff appeared in defense thereto and filed its counter affidavits and exhibits. Extended oral arguments were heard and briefs of no inconsiderable length submitted.

[1] Defendant's first premise is the alleged discovery of additional material evidence; its second, alleged error by the court in its findings, conclusions and decree. Defendant's action in the latter respect is equivalent merely to an attempt to reargue issues previously determined, after a vol-

uminous record had been made and full and complete briefs and arguments submitted. Such practice is not to be encouraged, for, if a court has once rendered its best efforts to arrive at proper solution of questions submitted, upon complete presentation, it should not be subjected to a demand to consider the same again. Otherwise, litigation would never end; "suits would become immortal, and the decision be postponed indefinitely." *Jenkins v. Eldredge*, Fed.Cas. No. 7,267, 3 Story, 200, 305 (Story, J.).

[2, 3] Defendant alleges that, since the trial, it has discovered additional material evidence, consisting basically of statements made to the Patent Office in the course of the solicitation of Bystricky patent No. 2,016,800, issued on October 8, 1935 to plaintiff, as assignee. Aside from any question as to materiality, when the patent was issued on October 8, 1935, its contents and the file wrapper thereof became available to the public, including defendant. Any time thereafter any one could have obtained a complete transcript of the record in and about the application for and allowance of the patent. Moreover, at the time of the trial herein, defendant's counsel had in its possession a transcript of the record of *Stewart-Warner v. Rogers and Stewart-Warner v. Universal Lubricating Systems, Inc., et al.*, suits tried in the District Court for the Western District of Pennsylvania, wherein defendants offered in evidence, the Bystricky patent and wherein, according to the said transcript, arguments were submitted to the court as to its admissibility and testimony was introduced regarding it, 29 pages in length, on October 30 and 31, 1935. Counsel for defendant stated, at the trial of this cause in April, 1936, that he had five volumes constituting the entire transcript in the said suit. Consequently, he was charged with notice of the contents thereof, and of the fact that the Bystricky patent had issued and that he had access to the file wrapper at any time. Furthermore, associate counsel, who now appears in the case, tried those cases in Pennsylvania. Thus, there is utter failure to show that defendant exercised reasonable diligence before the hearing in this cause, in procuring the evidence now proffered as newly discovered. This essential lacking, the court cannot rightfully consider the evidence. *Pittsburgh Reduction Co. v. Cowles Electric Smelting & Aluminum Co. (C.C.) 66*

*E. 125; McLeod v. New Albany (C.C.A.) 98 F. 378; Allis v. Stowell (C.C.) 85 F. 481; Moneyweight Scale Co. v. Toledo Computing Scale Co., 190 F. 905, 118 C.C. A. 235; Australian Knitting Co. v. Wright's Health Underwear Co., 121 F. 1017, 56 C.C.A. 678.*

Thus in *Combustion Utilities Corporation v. Worcester Gaslight Co. (C.C.) 190 F. 155*, a rehearing was denied where the defendant claimed to have discovered that another patent anticipated the one in suit, when such patent was referred to in the defendant's brief and record upon the original hearing. Similarly, because of the discovery of a mortgage on the patent, which was shown by the file wrapper then put in evidence. *Money-Weight Scale Co. v. Toledo Computing Scale Co. (C.C.A.) 190 F. 905.*

[4] However, despite the insufficient showing in this respect, the court, at a sacrifice of no inconsiderable time and labor, has examined the offered evidence and the other suggestions of counsel with a view to determining whether, had the plaintiff exercised diligence, there is anything in the newly offered evidence which would have changed the result or which bore materially upon the issues adjudicated. Obviously, the first question to be determined, is whether the new evidence sought to be introduced would have been material or helpful in determining the issues. If not, its proffer is wholly futile. *Section 647, Walker on Patents; Munson v. New York (C.C.) 11 F. 72; New York Grape Sugar Co. v. American Grape Sugar Co. (C.C.) 85 F. 212; Bates on Fed. Procedure, vol. 2, § 683; Foster's Fed. Practice (2d Ed.) 352.*

[5] The statement in the file wrapper, to which the defendant directs the attention of the court, was made by counsel for plaintiff herein as solicitors for the Bystricky patent, in the course of argument as to patentability of certain claims previously rejected, to the effect that the combination there submitted, had, in the short time it had been on the market, been universally accepted by manufacturers, and become standard equipment upon automobiles made in the United States. It was urged by the solicitor, therefore, that any doubts as to patentability should be resolved in favor of the applicant. In itself, of course, the statement is wholly valueless in the record, but it is urged by defendant that, followed to its logical conclusion, it

means that the Alemite Hydraulic System considered by the court in the present case was thereby admitted to be exclusively the invention of Bystricky.

Upon examination of the Bystricky patent and a re-examination of the record herein, although the validity of the patent is not before me, it seems obvious to me that Butler was a pioneer in the field of lubricant pressure in the sense that that term was used by the Supreme Court in the *Leeds & Catlin Case (Leeds & Catlin Co. v. Victor Talking Machine Co.)*, 218 U.S. 301, 29 S.Ct. 495, 53 L.Ed. 805, and that Bystricky invented an improvement upon the Butler construction. The findings of fact and conclusions of law heretofore entered, which I see no occasion to modify, pointed out Butler's invention and found that the Alemite System embraced the Butler invention. Nothing now urged moves me in the slightest degree to conclude otherwise.

Another statement of the solicitors in the file wrapper is that the Bystricky coupler was not "practically operative except in combination with a compressor of a certain definite type, in which means are provided to relieve or partially relieve pressure in the discharge conduit so as to facilitate disconnection of the coupler from the fitting." It is contended that this argument clearly indicated that the Alemite System does not embody the Butler invention, but rather that of Bystricky. Such statement is in nowise inconsistent with the record herein, for, as we have seen, Bystricky is merely an improvement upon Butler and used the same means for release of pressure. I conclude, therefore, that the proffered evidence, if received, would be immaterial, but if material, would not have affected the result.

The contention that the court has misconstrued the decision of the Supreme Court in *Bassick Mfg. Co. v. R. M. Hollingshead Co. (Rogers v. Alemite)*, 298 U.S. 415, 56 S.Ct. 787, 80 L.Ed. 1251, is clearly reargument of something fully presented at the original hearing. But I have again examined the opinions of the Supreme Court and have had submitted to me a transcript of the record of the *Hollingshead Case* in that court, as an exhibit in answer to the petition for rehearing. I adhere to what I have said in my opinion, findings, and conclusions in that respect.

In my memorandum, I made a statement to the effect that the record in the

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Hollingshead Case was rather short. Counsel for defendant disagree. The word is one of comparative connotation. The transcript shows 181 pages of testimony, which is a short record as compared with the present one. But whether the record was short or long, is, after all, wholly immaterial. The important thing was the limited character of the issue presented to the court.

Due to some mental aberration, in the original opinion, I made the statement that the Court of Appeals for the Sixth Circuit "affirmed" the holding of the lower court. Obviously the court did not affirm the decision of the district court, but did agree with its conclusions in the respects under consideration when I used the expression.

The word "affirmed" should have been "agreed." If we attribute to the word "affirm" its strict legal significance, the error, in the words of counsel for plaintiff, was merely lapsus linguae.

We may well again refer to the character of the Butler patent. I have pointed out in my findings of fact and conclusions of law heretofore entered that Butler was the first to propose or devise a lubricating system in which the sealing of a joint between the end of the nipple and coupler and the mechanical grip between the nipple and coupler were achieved automatically by the pressure of the lubricant in and by the normal pumping operation of the compressor, and that the advantage of this combination arises from the fact that in the greasing of automobiles, in forcing grease into the bearing through the narrow opening of the fitting, thousands of pounds of pressure are sometimes utilized in order to remove and force out foreign bodies in the grease duct or channel. Former devices provided a seal by a screw connection between the coupler and the fitting, by a bayonet connection or by mere manual physical pressure. In all of these, some leakage occurred, and physical manipulation entailing some labor was necessary. In none of them could the pressure be exerted and the grease delivered perfectly without leakage, under desirable pressure, and with the saving of labor resulting from Butler's teaching. I previously pointed out, due to the peculiar shape of this nipple, its head and shoulders couple with the gripping jaws of the coupler in such a way that, when pressure is exerted and the grease passes from the coupler in-

to the fitting, the coupler grabs hold of the projecting shoulder of the nipple with its jaws and automatically, as the pressure of the grease increases, simultaneously, the power, force, and closure of the connection increases, so that it is impossible for grease to escape and any desired pressure of grease may be transmitted without breakage of parts or leakage of material. All this was accomplished without further manipulation other than the easy, almost automatic, attachment of the coupler to the nipple and the application of the pressure. This, I have said, was a step forward in the greasing of automobiles. No one had ever taken it, though the art is full of grease guns and nipples. It remained for Butler to devise an easy operable combination in which the nipple and the coupler automatically co-operate, each contributing its part to the one result of high-pressure grease delivery through a sealed connection, effected automatically and increasing in efficiency with the increase of the pressure. This, I said, was invention and the combination, I held, became, therefore, a pioneer invention in the sense that the Supreme Court used that word in the *Leeds & Catlin Case*.

[6, 7] Obviously, most modern inventions are of combinations. Changes in the art are effected either by the addition of new elements, the withdrawal of existing elements, alteration in their qualities or arrangement or substitution of a new element for one previously employed. Each of these changes may effect a mere change of form, or an improvement of an old invention, or a new invention. If the new combination involves only a variation in the method of reducing the original idea to practice or if, while varying the idea of means, it neither changes its essential character nor gives substantial increase to its practical efficiency, it is a mere change of form, involving no invention. "If the change indicates the introduction into the idea of means of a different force, a different object, or a different mode of application, it is more than a change of form, more even than an improvement; it is a separate invention. If it preserves the essential characteristics of the original invention, applying the same force to the same object by the same method, but accomplishing results with higher excellence or with greater economy of time or power, and is not the product of mechanical skill alone, it is an improvement." *Robinson on*



Patents, vol. 1, ch. 11, § 215, p. 299. (*Italics mine.*)

"Where the apparent variation in the original invention produces no change in its effects or in the economy of time or power, if the factors and the mode of operation of the original and improved inventions are the same, the variation must be in embodiment alone; if different, the inventions are entirely independent of each other. *Where the effects produced by the invention in its changed condition differ in nature from those accomplished by it in the old, the change has passed beyond the limits of a mere improvement and has resulted in a new invention.* If the effects, although the same in nature, are so enhanced in excellence that the original idea of means, in no form of embodiment, could have produced them, the change is more than formal, but may be either an improvement or a new original invention. In this case, as in that wherein no change occurs in the effects, the original and improved inventions must be compared as operative means and examined in their mode of action as well as in the subordinate idea of which each is composed. If this examination discloses a substantial difference, either in the nature of the operation or the means, the two inventions are distinct; otherwise the latter is a mere improvement on the earlier." Robinson on Patents, vol. 1, ch. 11, § 216. (*Italics mine.*)

So, here, Butler introduced into the art the idea of an automatic sealing connection achieved by the size and character of elements, which, in themselves, were old. But he employed a different mode of operation. He achieved his object by means of a different force and according to a different and new conception. His invention then was not an improvement but a new and separate invention, and, within the reasoning of the Supreme Court in the Leeds & Catlin and the Hollingshead and Rogers Cases, a pioneer. In the latter two cases the court was not dealing with a combination patent wherein, by the use of a nipple of a certain particular form and shape and dimensions co-operating with the gripping jaws of a coupler of special form and shape, an automatic unbreakable connection was achieved, making possible that highly desirable thing in automobile construction, unlimited pressure. Butler did not combine a certain coupler with any nipple. He did not combine a certain nipple with any coupler. He was not, as the

Supreme Court believed Gullborg had done, trying to extend his patent to a combination of a certain nipple with any kind of grease gun. Quite to the contrary, he demonstrated conception of a new creative thought, the achievement of a new valid combination in which not only the coupler was essential, but in which also the nipple of peculiar shape and dimension was essential. He produced a new combination, a new arrangement of known elements, by virtue of which he produced an entirely new and beneficial result. He developed new functions and new properties and achieved novelty, resulting in great commercial success.

In this situation, defendant entered the field and developed its nipple of equivalent form, shape, and dimensions, which it sold, obviously, for use with Alemite guns, supplanting in the combination of Butler the nipple essential to his success. It is a striking fact that a nipple of this shape and dimension was not necessary to the operation of defendant's grease gun or of any guns other than those of plaintiff or of infringers or licensees of plaintiff—a fact of tremendous significance in determining the purposes and intent of defendant. It sold grease guns which operated with straight-headed nipples as well as with nipples with head and shoulders. It first made straight-headed nipples and exhibited them to General Motors Corporation, but it sold to that company only nipples of infringing character, a character not essential to any combination other than plaintiff's.

Despite the fact that the court would have been justified in denying the petition for rehearing because nothing therein constituted newly discovered evidence and because the record shows that the defendant failed to exercise reasonable diligence to discover the evidence claimed to be newly discovered and despite the inclusion in certain affidavits of improper, well-nigh scandalous, irrelevant averments, I have examined everything submitted, re-examined the authorities, and again endeavored to make myself clear. Clearly, no new material evidence has been suggested. The attempt to reargue the merits of the case, though not exactly praiseworthy upon the part of counsel, has been met by a re-examination of the record and of my findings and conclusions. The petition for hearing is denied.

[8] It appears that the decree was too broad in enjoining the manufacture and

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sale of the nipple contributorily infringing, beyond the limits of the United States. Accordingly, the original decree is vacated, and a decree properly enjoining defendants only within the United States and in conformity with my findings of fact and conclusions of law and this memorandum will be entered. \_\_\_\_\_



District Court, N. D. Illinois  
STEWART-WARNER CORPORATION

v.

JOHN R. LE VALLY and FREDERICK A. FAVILLE, doing business as LINCOLN ENGINEERING COMPANY OF ILLINOIS, and LINCOLN ENGINEERING CO. OF ILLINOIS  
Equity No. 13955 Decided Oct. 26, 1936

**Patents—Injunction—In general—**

Whether court shall grant supersedeas lies within its discretion and that discretion should not be abused; supersedeas is denied where infringement is clear and can be avoided readily by slight change which defendant is already prepared to make.

**Patents—Appeals to Circuit Court of Appeals—In general—**

District Court approves bond on appeal, enters order and citation, but does not approve assignment of errors which put into its words something expressly disclaimed in its memoranda; court does not tell clerk what shall be incorporated in record or go in praecipe.

On defendant's petition for supersedeas and stay of injunction.

(See also 30 USPQ 343 and 31 USPQ 171.)

LYNN A. WILLIAMS for plaintiff; DELOS G. HAYNES for defendants.

LINDLEY, District Judge.—It is obvious, of course, that whether the Court shall grant a supersedeas, lies within its discretion, and that discretion should not be abused.

This case has been before the Court for some time and a rather extensive record was made up on the trial of the case. The Court expended a great deal of time, care and study in the preparation of its memoranda, its findings of fact and conclusions of law, and a decree was entered [30 USPQ 343]. A petition for rehearing was filed and an assignment of errors upon the part of the Court, and on September 12th, a rather extensive hearing was heard upon that, and again, the Court made a scrutiny of the record and again gave its best efforts to the examination of the record and the decisions which it was contended he had a complete misapprehension of, and again a memorandum was prepared and submitted to Counsel, and again a decree entered, modifying in one particular a provision of the decree which was obviously too wide [31 USPQ 171].

Now, it is desirable that litigation be ended; it is desirable that there be some diligence toward the prosecution of an appeal and the early disposition of it. I have the conviction that this patent is valid. I have the conviction that it is being infringed and an infringement of a patent is a tort. There is a continuing tort being committed by the defendants, a tort which a Court of Equity has seen fit to enjoin and a tort which the Court believes unjustified; a tort which the Court believes, by a mere minor modification in the manufacture of one small article, could be wholly avoided, and the strange commentary—the strange fact which stares us in the face, is that the particular form of manufacture, the particular shape of this small fitting, is, in no way, a vital idea to the defendant in cooperation with its other articles of manufacture, and this peculiarly shaped fitting is the one which is adapted to plaintiff's combination. Having found that this fitting was made for the express purpose of being sold to be used with and as a part of the infringed plaintiff's combination, and having found there was no excuse for the perpetration of that

tort in the protection of the defendant's interests, I am not disposed at this time, in view of the time that has elapsed since the hearing, to grant a supersedeas. I make this statement so that it may be presented to the Court of Appeals. That Court may grant a supersedeas. I want this case heard on appeal and heard soon, and I think if I deny supersedeas, I can speed matters up so that it can be heard at the January session. I can't see that this defendant can be injured in any way. Of course, it is a selling agency, but its selling agency is allied with the manufacturer and the manufacturer defended the case. They can make their nipples, as they proposed, with a straight side; they can eliminate the head and shoulder; they can do that overnight. They have their drawings all made—they have had them for several years. They started out with the straight side nipple but the Oldsmobile people wouldn't take them.

The prayer for supersedeas will be denied, bond for the appeal to be fixed at Three Hundred (\$300.00) Dollars, and the form of the order will be the form submitted by Mr. Williams.

I don't approve of the assignment of errors, for they put into my words something which I expressly disclaimed in my memoranda, and I don't want the Court of Appeals to be misled as to what I did hold. I have tried to make it clear in the two memoranda which I prepared in this case, and I shall not be misquoted without an expression of my disapproval of the form of the assignment of errors, and I shall not tell the clerk at this time what shall be incorporated in the record and what shall go into the praecipe, because that is pre-judgment. The rule is that that should be made up when the praecipe is filed.

The bond for the appeal in this case shall be fixed at Three Hundred Dollars (\$300.00) and the citation be issued as of this date, and I suppose you can get service upon Mr. Williams at this time, since he is present.

Mr. Williams: I accept service right now.

The Court: You have your bond, Mr. Haynes?

Mr. Haynes: It will be less effort to file a bond for One Thousand Dollars than Three Hundred Dollars, as I have a bond for that amount.

The Court: Very well, I will make it One Thousand (\$1,000.00) Dollars, so that you will have it. The Massachusetts Bonding and Insurance Company is a recognised bonding company?

Mr. Haynes: It has been signed by an attorney-in-fact who tells me his name is registered in the Court in Chicago.

The Court: I approve the bond. Let the record show the bond approved, order entered and citation issued.



LINCOLN ENGINEERING CO. OF ILLINOIS v. STEWART-WARNER CORPORATION  
 No. 6103.

Circuit Court of Appeals, Seventh Circuit.  
 June 29, 1937.

Rehearing Denied Sept. 15, 1937.

1. Patents  $\S$  26(1)

A "combination" contemplates a plurality of units, but patentable invention can only reside in a "combination" when it is considered as a unit.

[Ed. Note.—For other definitions of "Combination (In Patent Law)," see Words & Phrases.]

2. Patents  $\S$  41

If all elements of unit are old but have never appeared together in combination, and they coact so as to avoid charge of aggregation, the combination is not lacking in novelty so as to bar patentability.

3. Patents  $\S$  42

Where combination consists of five elements and inventor uses four elements in same way and for same purpose as in previous combination, but substitutes new element for remaining element of old combination and obtains desirable results, new combination is not lacking in novelty so as to bar patentability.

4. Patents  $\S$  41

Where combination consists of five elements and inventor uses four old elements in same way and for same purpose as in previous combination but substitutes for remaining element old and well-known element which has never been used in combination with such other four elements, new combination may be patentable.

5. Patents  $\S$  26(14)

An old combination may not be repatented.

6. Patents  $\S$  323

Patent No. 1,598,791, claim 2, dealing with a lubricating apparatus, is not invalid for anticipation by prior art.

7. Patents  $\S$  42

If a new product is found to be patentably novel, it is immaterial whether patentable novelty is of pioneer type or mere improvement type of invention.

8. Patents  $\S$  323

Patent No. 1,598,791, claim 2, dealing with a lubricating apparatus, is valid, as de-

scribing a "combination," and not an "aggregation."

[Ed. Note.—For other definitions of "Aggregation," see Words & Phrases.]

9. Patents  $\S$  26(14)

The names of various parts embodied in patent did not determine whether unit was "combination" or "aggregation," and if there was coaction of elements so as to make single unitary structure, there was a patentable "combination."

10. Patents  $\S$  259(2)

The supplier of an element in a valid combination embodied in a patent might be guilty of infringement, though element was not patentable, and was old.

11. Patents  $\S$  255

If element of patented combination in very nature of its use wears out, new element may be furnished without producer's infringing.

12. Patents  $\S$  226, 259(1)

An infringer and a contributory infringer are tort-feasors.

13. Patents  $\S$  259(1)

The maker, buyer, or seller of non-patented article is guilty of "contributory infringement" only when it knows that non-patented element is to be used in connection with other elements in valid combination covered by valid patent.

[Ed. Note.—For other definitions of "Contributory Infringement," see Words & Phrases.]

14. Patents  $\S$  259(1)

There can be no "contributory infringement" unless elements in question comprise a "combination," and not merely an "aggregation," since no valid patent can cover an "aggregation."

15. Patents  $\S$  25

As respects patents, the term "aggregation" defines a phase of general term "non-invention," and when claims compose plurality of elements and their individual or collective selection fails to evidence exercise of inventive faculty, it is not a patentable discovery, regardless of whether coaction of elements is present, but inventive concept may reside in selection of part or parts of numerous old elements, if selection is unusual and hitherto pressing unsolved problem is thereby overcome.

**16. Patents  $\Leftrightarrow$  25 (134)**

Invention may be evidenced by modifying coaction of elements, but there may be invention without coaction.

**17. Patents  $\Leftrightarrow$  25, 26 (1)**

As respects distinction between "combination," which is patentable, and "aggregation," which is not, a "combination" is present if there be correlation or co-ordination of elements which mutually contribute to accomplishment of some result, and there need be no interdependency in sense of one element being dependent on the others for functioning.

**18. Patents  $\Leftrightarrow$  45**

As respects patentable novelty, evidence of wide and popular acceptance of patented apparatus is controlling in doubtful cases.

**19. Patents  $\Leftrightarrow$  328**

Patent No. 1,593,791, claim 2, dealing with a lubricating apparatus, is not invalid for lack of patentable novelty.

**20. Patents  $\Leftrightarrow$  328**

Patent No. 1,593,791, claim 2, dealing with a lubricating apparatus, was infringed.

Appeal from the District Court of the United States for the Northern District of Illinois, Eastern Division.

Patent infringement suit by the Stewart-Warner Corporation against the Lincoln Engineering Company of Illinois. From an adverse decree, defendant appeals.

**Affirmed.**

Leonard L. Kalish, of Philadelphia, Pa., Deles G. Haynes and Lloyd R. Koenig, both of St. Louis, Mo., and Milton T. Miller, of Chicago, Ill., for appellant.

Lynn A. Williams, of Chicago, Ill., for appellee.

Before EVANS, SPARKS, and MA-JOE, Circuit Judges.

EVANS, Circuit Judge.

Appellee is the owner of the Butler Patent, No. 1,593,791. Appellant is the distributor of the Lincoln Engineering Company of St. Louis, Missouri, which is conducting and controlling the defense to this litigation. It is charged with infringing the Butler Patent. The trial was a long one, and the District Court prepared his own findings and conclusions which fully covered the nature of the invention, the claims, the

defenses, the state of the art, as well as other material issues. These findings favored the appellee.

Accompanying the findings was an opinion which set forth the reasons for the conclusions which the court reached. About three months later, upon a petition for rehearing filed by appellant, the court filed a second opinion, which may be found in *Stewart-Warner Co. v. Levally* (D.C.) 18 F.Supp. 778. Three weeks later the court filed a third opinion which dealt with questions raised by appellant. The third opinion appears in 31 U.S.P.Q. 195. Reference is made to the places where these opinions appear because it will, we think, justify a more abbreviated statement of the facts. Different conclusions respecting the same claim (No. 2) of this patent, so appellant asserts, were reached by other Federal courts. *Stewart-Warner Corporation v. Jiffy Lubricator Co.* (C.C.A.) 81 F. (2d) 486; *Stewart-Warner Corporation v. Rogers* (D.C.) 15 F.Supp. 410.

The decree subsequently entered granted an injunction that restrained future infringements of the patent and directed an accounting of profits and damages occasioned by past infringements.

The application for the Butler patent was filed February, 1923, and the patent issued July 27, 1923. It related to Lubricating Apparatus.

Claim No. 2, the one in issue, reads as follows:

"2. The combination with a headed nipple for receiving lubricant, of a lubricant compressor having a coupling member for connecting said compressor and nipple comprising a cylinder, a piston movable within the cylinder and having an aperture for the discharge of lubricant thereof, an apertured sealing seat carried by said piston for engagement with the end of the nipple, connecting the piston aperture with a passage through the nipple, radially movable locking elements carried by the cylinder coacting with the nipple and actuated by said piston for compressively clutching the elements upon the nipple whereby the pressure of the lubricant on said piston will move the piston to forcibly compress said elements while the lubricant is passing through said connecting parts."

The patent deals with a lubricating apparatus. Butler's object, as stated by him, was "to provide a means of forcing under high pressure fluid and semi-fluid lubricant



"ing compounds into bearings, \* \* \* in order that foreign material and used lubricant therein may be forced out of the bearing. \* \* \* His specifications described a "co-operating" bearing and self sealing bearing lubricating valve, \* \* \* a bearing reservoir for lubricant and means for automatically feeding the lubricant therefrom to the bearing, \* \* \* and "automatic and semi-automatic means of connection between the bearing valve and the lubricating pressure means \* \* \*" are described.

Judge Lindley, describing the patent, said:

"\* \* \* Butler was the first to propose or to devise a lubricating system in which the sealing of the joint between the end of the nipple and the coupler and the mechanical grip between the nipple and the coupler were achieved automatically by the pressure of the lubricant in and by the normal pumping operation of the compressor, \* \* \* the advantage of this combination arises from the fact that in the greasing of automobiles, in forcing grease into the bearing through the narrow opening of the fitting, thousands of pounds of pressure are sometimes utilized \* \* \* due to the peculiar shape of this nipple, its head and shoulders couple with the gripping jaws of the coupler in such a way that, when pressure is exerted and the grease passes from the coupler into the fitting, the coupler grabs hold of the projecting shoulder of the nipple with its jaws and automatically, as the pressure of the grease increases, simultaneously, the power, force, and closure of the connection increases, so that it is impossible for grease to escape and any desired pressure of grease may be transmitted without breakage of parts or leakage of material. All this was accomplished without further manipulation other than the easy, almost automatic, attachment of the coupler to the nipple and the application of the pressure."

In short, the asserted superiority and virtue of the Butler lubricating apparatus are twofold: (a) The apparatus permits of the application of thousands of pounds of pressure with no loss of grease, and (b) an easily operable device wherein the coupler's grip increases with the pressure of the grease.

The substance of the more important findings of the trial court is:

1. In practical operations, grease pressures running up to thousands of pounds per

square inch are frequently required in order to force the grease into the interstices of a bearing.

2. When the compressor is operated under these high pressures, the tendency is to burst the compressor, coupler, and the nipple, and to break open the connection between the coupler and the nipple by forcing these parts asunder. To avoid this break or separation of coupler and nipple, the maximum tightness of seal and the maximum mechanical grip must be obtained and must be proportional to the pressure of the grease to be transmitted.

3. In the Butler apparatus the automatic end seal and the automatic grip both become more effective as the lubricant pressure increases and the need for a more effective seal and grip becomes greater. Butler's seal member is movable and thus may adjust itself to fittings of slightly different dimensions.

4. In the Butler combination the end seal and automatic grip both become more effective as the lubricant pressure increases. The end seal member is movable and thus may adjust itself to fittings of slightly different dimensions. Any resiliency referred to in the patent as constituting spring fingers serves the purpose of compensating for any slight out of roundness of the fitting.

5. Butler presented to his solicitor a sample device including a coupler, the jaws of which were forced into clamping engagement with the nipple by a relatively rigid, hollow, cylindrical part corresponding exactly to the disclosure of Figure 2 in the Butler patent.

6. Butler was the first to devise a lubricating system in which the sealing of the joint between the end of the nipple and coupler and the mechanical grip were effected automatically by the pressure of the lubricant, which pressure was produced by the normal pumping operation of the compressor.

7. Claim 2 is the only one in issue and describes a combination of seven elements: (a) nipple, (b) a compressor, (c) cylinder, (d) piston, (e) aperture, (f) jaws, (g) sealing seat. "Each and all of these parts co-operate with one another in new ways in the accomplishment of a new and unitary result."

8. Appellee began selling Butler lubricating equipment in April, 1933, and prior thereto sold apparatus covered by the Gullborg and Zerk patents. From April, 1933,

to March, 1936, it sold 231,555,000 fitting parts of the Butler combination, and 6,306,000 coupler parts. Over half of the latter were sold with the associate compressors to automobile manufacturers, to be put in the tool kits at the factory. Within eight months after its introduction, the Butler system had been adopted as the factory lubricating equipment of every automobile and truck made in the United States with one exception.

9. "The mechanism embodied in the means by which the jaws are compressed about the nipple of \* \* \* (appellee's) system is identical in its mechanical principles with that disclosed in the Butler patent. It is a simple equivalent involving a mere reversal of parts."

10. Appellee's system comprises a combination of elements, as set forth in claim 2 of the Butler patent.

11. Prior to 1933, appellant was engaged in the business of making and selling automobile lubricating equipment to appellee. In 1933, it began selling lubricating apparatus to others. It made and sold couplers and nozzles with the expectation that they would be used with appellee's apparatus. Its nipples were sold with the knowledge that they could, and would, be used as part of appellee's combination. The dimensions of appellant's fittings are exactly such as to fit appellee's coupler. If they did not select exact dimensions such cooperation would have been impossible. Appellant's "Lincoln Kleenseal Fittings" were sold to be used in combination with the compressor and coupler parts of the Butler combination as made and sold by appellee. Appellee sold its compressor and coupler parts of the combination to public garages and service stations in the United States, and appellant offered its fitting parts to be used by the said garages in connection with the Butler combination. Appellant duplicated fitting for fitting all of the arbitrary dimensions of the entire line of appellee's fittings.

12. The Butler patent does not require the use of spring fingers which can yield a substantial amount.

13. Appellant's model of Figure 2 of the Butler patent does not accurately or fairly represent the invention of Butler.

14. Claim 2 of the Butler patent describes both a "Lincoln Kleenseal" fitting, appellant's product, and "Alemit Hydraulic" fitting, appellee's product.

As conclusions, the court found:

That claim 2 of the patent is valid, and defendant contributorily infringed it by the sale of "Kleenseal" nipples or fittings, exemplified in plaintiff's Exhibits 27a and 27b; and that appellee is entitled to an injunction and to an accounting.

Appellant challenges the decree on three separate, distinct grounds, stating each with commendable frankness, brevity, and clarity:

(1) Butler's hose coupler can not be validly claimed in combination with a non-patented lubricant receiving nipple or an old compressor, particularly where his conceded purpose is not merely to monopolize the hose coupler, but to include in the monopoly the admittedly old device which is used with it. To support this position appellant relies upon *Bassick Manufacturing Co. v. R. M. Hollingshead Co.* (Rogers v. Alemit Corp.), 298 U.S. 415, 56 S.Ct. 787, 791, 80 L.Ed. 1251.

(2) The coupler of the Butler patent shown in Figure 2 is not the so-called "Alemit Hydraulic" coupler. Supporting this position, appellant relies upon the facts brought out by the evidence and the holding in *Stewart-Warner v. Jiffy Lubricator Co.* (C.C.A.) 81 F. (2d) 786.

(3) The Butler multi-jaw chuck type hose coupler is not a patentable improvement over the multi-type hose coupler of the prior art. As bearing upon this issue, it contends that the evidence does not support the findings of validity because the Butler hose coupler as described by Butler both in Figure 2 and in his claim never went into commercial use. It likewise argues that extensive use where the trade was so dominated by Stewart-Warner is not persuasive of validity.

The importance of the suit and the effect of the Bassick opinion upon the whole field of patent law make it impossible for us to dispose of the case in an opinion of desirable and satisfactory brevity.

While going no further than is necessary to defeat the patent in the present case, the conclusion from appellant's brief is unavoidable, that *Bassick Mfg. Co. v. R. M. Hollingshead*, supra, revolutionized the law of patents and repudiated the position of courts, including many decisions in this circuit, long accepted as the law in patent cases. This revolutionary concept was accepted and applied by the District Court (in

Pennsylvania) in *Stewart-Warner v. Universal Co.*, 15 F.Supp. 410.

The Bassick opinion, while dealing with another patent, is more persuasive in this case, because the patent in issue here deals with some of the same old elements of a combination as were described in the Gullborg patent, the validity and infringement of which were the subject matter of the *Bassick Mfg. Co. v. R. M. Hollingshead* opinion.

The Gullborg patent had been the subject of much litigation, as pointed out in the opinion, and it dealt, as here with (1) a type of pin fitting, (2) a grease gun, (3) a connecting hose, and (4) a type of coupler.

While it is, of course, conceded that every opinion must be read in the light of the facts to which it applies, yet there are cases where the differences in the facts are so inconsequential, so immaterial, that the opinion must be accepted as authoritative and controlling.

The uppermost question in this case is the controlling effect of the *Bassick Mfg. Co. v. R. M. Hollingshead* opinion, *supra*. We are not disposed to limit it in order to bring about an avoidance of any new principle it may announce. Nor are we inclined to give it an effect which was not intended, if it does not follow from a fair construction of its language.

The novel proposition which appellant seeks to apply to the present case is to be found in the language on pages 424, 425, of 298 U.S., 56 S.Ct. 787, 791, 80 L.Ed. 1251. There it was said:

"It is plain that Gullborg invented improvements of two of the mechanical elements of an old combination consisting of grease pump, hose, hose-coupler, and a grease cup or pin fitting. First, he contrived an improved pin fitting. This he patented as such. No. 1,807,783. Secondly, he invented an improved form of coupler to be attached to the end of the hose leading from the pump to the fitting. Instead of patenting this, as he did the pin fitting, he claimed a combination of pump, hose-coupler, and pin fitting, and embodied in the combination his improved form of coupler. No. 1,807,734, the patent in suit; claims 1-6, 8, and 10. He further claimed the combination between his patented pin fitting and any form of grease gun whether that claimed in his patent or unpatented and old in the art. Claims 14 and 15. The question then is whether, by this

method, the patentee, by improving one element of an old combination whose construction and operation is otherwise unchanged, may, in effect, repatent the old combination by reclaiming it with the improved element substituted for the old element. That this cannot be done is shown by numerous cases in this and other federal courts."

The paragraph of the opinion which follows the quotation serves as a modifier of the strict letter of the rule thus announced. There, the court says:

"*Leeds & Catlin Co. v. Victor Talking Machine Co.*, 213 U.S. 301, 325, 29 S.Ct. 495, 53 L.Ed. 805, on which the respondent relies, is not in point. There the patent was a pioneer patent and the combination was of elements which were novel and neither of which possessed utility without the other. Each element was necessary to the operation of the other. The invention did not, as here, consist of the mere improvement of one element of an old combination."

If the court announced a rule in the *Bassick Case* as contended by appellant's counsel, or if all of its implications (the substitution of a new element for an old element does not afford the basis of a valid patent) be accepted as the present law respecting the validity of patents then *Leeds & Catlin Co. v. Victor Talking Machine Co.*, 213 U.S. 301, 29 S.Ct. 495, 53 L.Ed. 805, is overruled. However, instead of stating that the *Leeds & Catlin* opinion is overruled, the court distinguished it and thereby impliedly recognized the soundness of the rule there announced:

Until and unless there is an express repudiation of the *Leeds & Catlin Co. v. Victor Talking Machine Co.* Case, we can not accept the *Bassick Mfg. Co. v. R. M. Hollingshead* opinion as being inconsistent with the views stated in the former opinion. In other words, we must apply to the instant case the rules of law which govern and apply the tests which have long been applied to determine whether the *Butler* combination is a patentable invention.

[1] In dealing with product patents and their validity it might be observed that the word "combination" is somewhat unfortunate. A combination contemplates a plurality of units, yet patentable invention can only reside in a combination when it (the combination) is considered as a unit. For convenience's sake, courts speak of elements in a combination as units in and of them-



salves. It is only for the sake of convenience that reference is made to such elements as 1, 2, 3, 4, and 5. Each and every valid claim of a patent covers a *unit*, although in a combination claim the unit may have five parts or elements. When we so consider a claim it is clear that one unit must differ from another unit if one element, say element three in one combination is different from element three in another combination. To illustrate: If one mixes five different colored paints in stated proportions, he would have a product which might be denominated X. X must be viewed as a unit. If the same individual mixed in the same proportions five different colored paints, four of which were similar to the ones in the first combination but one was different, the final product would not be the same. In testing the validity of any machine or product patent, then, whether it be what is commonly called a combination, or a single, a noncomposite substance, the following propositions may be accepted as sound:

[2] 1. All the elements may be old but if they have never appeared together in combination and they co-act so as to avoid the charge of aggregation, the unit *may* constitute a valid claim of a patent.

[3] 2. Where a combination consists of five elements—1, 2, 3, 4, and 5—and the inventor uses four old elements—1, 2, 3, and 5,—in the same way and for same purpose as in the previous combination, but substitutes a new element 4 for old element 4 of the old combination and obtains desirable results, the new combination may be the subject of a valid claim. It is not anticipated by the previous combination.

[4] 3. Likewise, one may substitute for element 4 an old and well-known element but which has never been used in combination with elements 1, 2, 3, and 5, and these elements being presented in the new combination for the first time may be the subject of a valid patent.

In stating these propositions, we have used the word "*may*" for there are other factors to be considered in determining patentability. For instance, the novelty may not be patentable. The advance may represent the skill of the artisan or the mechanic, not the genius of the inventor. Perhaps it would be better to say that the objection that the combination is lacking in novelty is not sound under the conditions enumerated.

[5] Equally clear is the law which denies to anyone the right to repatent an old combination.

[6] Accepting the foregoing principles as sound and applying them to the instant case, we have no difficulty in distinguishing any of the prior art. Nor are we troubled by the decision in the Bassick Case. The Butler coupling member and his nipple head are novel. Their structures are clearly distinguishable from the prior art. Whether the other mentioned elements are old is immaterial.

[7] The only validity questions left relate to combination as distinguished from aggregation and the character of the discovery—whether it marks patentable novelty or mechanical skill. In passing, it might be observed that if a new product is found to be patentably novel, it is immaterial whether said patentable novelty is of the pioneer type or "the mere improvement type" of invention.

Appellant also relies upon the Bassick Case as authority for its contention that contributory infringement is not disclosed upon a showing that it furnished nipples and grease guns, even though made in such a way as to be used as an element in the Butler combination.

The last paragraph of the Bassick opinion is cited in support of appellant's position. It reads as follows:

"We are of the opinion that the owner of the patents cannot extend the monopoly of its patent for a pin fitting to preclude the use therewith of any grease gun not embodying the improvement in the coupling device evidenced by the patent in suit; and cannot extend the monopoly of the combination patent in suit to prevent the use of a pin fitting which does not infringe the fitting patent, 1,807,733, with a gun having a coupler such as that claimed in the patent in suit."

We accept, of course, without question this opinion as applied to the facts in the case that was before the Supreme Court.

In the instant case, Butler does not seek to extend the monopoly of a patent for a pin fitting or to preclude the use of a grease gun in any apparatus not embodying the improvement described in the patent.

Two questions are determinative: First, did Butler set forth a valid patentable combination when he wrote his claim No. 2? Second, did the sale of a headed nipple or a

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lubricant compressor made for the sole purpose of being used in connection with the apparatus made according to the Butler patent, constitute infringement?

[8, 9] *Combination or Aggregation.* As we view claim 2 of the Butler patent, it spells combination, not aggregation. It is not the names of the various parts that determine this question. If there be coaction of elements so as to make a single unitary structure, we have a combination. The nipple head may be a non-composite apparatus. It may be the subject of a valid patent claim. Likewise, it may be part of a combination.

[10] In the instant case, it is conceded that the headed nipple was not patented. More, it is not patentable. It will be assumed that it was old. Nevertheless, if it is an element in an otherwise valid combination (due to the novel coupling method), it is a unit of said combination and a third party supplying it, if other necessary facts are shown, may thereby infringe.

Whether the supplier of headed nipples or other elements of the combination set forth in claim 2 is a contributory infringer depends first on whether the element supplied is a part of a valid combination (as distinguished from an aggregation), and second, on whether the producer so constructs it that it can be said that it was knowingly made with the intention that it would be used in connection with the patented combination.

[11] There is an exception to this statement—If an element of a patented combination in the very nature of its use wears out and a new one is supplied, it may be furnished without the producer's infringing. *Heyer v. Duplicator Mfg. Co.*, 263 U.S. 100, 44 S.Ct. 31, 68 L.Ed. 189; *Leeds & Catlin Co. v. Victor Talking Machine Co.*, 213 U.S. 325, 29 S.Ct. 503, 53 L.Ed. 816. But, where the intent is present, as here, to supply separate units of a patented combination and not as a renewal of a worn out part, contributory infringement is disclosed.

The findings of the District Court on this question respecting the dimensions of appellant's headed nipple clearly show an intention to make parts which could only be used in connection with the patented combination. If, then, the Butler claim No. 2 disclosed a valid combination, infringement was shown.

[12] In dealing with this subject of contributory infringement, it might be observed that we are dealing with a phase of the gen-

eral subject of torts. An infringer is a tortfeasor. A contributory infringer is one whose action contributes to the infringement.

[13] Because of the statute, the owner of a patent is entitled to exclude others from making, selling, or using the patented product. Violation of any of these rights makes the violator a tortfeasor, an infringer. Making, buying or selling a non-patented article is not of itself infringement. It only becomes so when said maker, seller or user does so knowing that the non-patented element is to be used in connection with other elements in a valid combination covered by a valid patent. This is the doctrine of contributory infringement.

In the instant case, the court has made findings, and the facts leave no doubt as to the soundness of such findings, to the effect that the non-patented parts made by appellant were not only intended for use in connection with Butler's patented combination but they could hardly be used otherwise. The size and dimensions of the fittings most conclusively demonstrate this fact.

It might be asserted that appellant did not infringe when it *manufactured* one element of the product for it could have been sold to one who would use it other than in the Butler patent combination. However, when it appears that such products were made by the appellant and sold to garages and it further appears that the fittings were of such measurement as to preclude their use except on appellee's patented apparatus, contributory infringement both in selling and in using is established.

To establish contributory infringement the following facts must appear: (1) a valid patent; (2) ordinarily in the case of a product patent covering a combination; (3) the alleged infringer must make or supply one or more of the elements of the combination with the knowledge and intention that the same is to be used in the patented combination.

Contributory infringement is the outgrowth or result of the application of the following legal propositions:

(1) A patentable combination is a unit in the contemplation of the law.

(2) Some elements of the combination may be old and others new, or all old, or all new.

(3) One who makes, sells or uses the combination without permission of the patentee is an infringer.

(4) One may be a contributory infringer although he makes, sells or uses an element that is old and not covered or coverable by a patent.

(5) When the manufacturer makes, uses or sells an unpatented (an old) element, he becomes a contributory infringer only when the element is knowingly made, sold or to be used as a part of a patentable combination without patentee's express or implied consent.

(6) Implied consent exists when in the ordinary use of the patentable combination one element constantly and frequently wears out and must be replaced. *Heyer v. Dupli-cator Mfg. Co.*, *supra*. Whether there is a consent is often a fact issue, but not involved in the instant suit.

[14] In the last analysis this question of contributory infringement in the instant suit must be determined by the existence or absence of a valid combination wherein one of the essential elements was a product made by appellant. If the elements do not spell a combination, but are merely an aggregation, there is of course no contributory infringement.

For obviously, infringement can exist only when there is a valid patent. No valid patent can cover a group of elements which are correctly termed an aggregation and which do not conform to the correct legal definition of a combination. There is a valid combination only when the element-headed nipple co-acts with the lubricant compressor and the coupling member. If two of these elements do not co-act and the third element does not likewise co-act with one of the other two members, we do not have a case of valid combination.

Doubt over this issue can only arise when one of the elements may in itself serve a multiple of purposes. It may be used outside the combination of the patent. If so, its use is valid and legitimate. The determining fact issue is the intent and the purpose it serves, and was intended to serve when made or sold. If made, sold or used as an intended element in the combination which is the basis of the patent claim, it is a case of contributory infringement, otherwise not.

In disposing of the defense of aggregation, we have accepted the rather common meaning of that word and, for the purpose of the argument only, assumed it to be a valid defense in patent cases when established. We have adopted this meaning for

the purpose of the argument only, for otherwise we would hesitate before accepting it.

In our opinion the defense of aggregation is considerably overworked. The term "aggregation" is usually preceded by the word "mere" and describes a group of elements which fall far short of invention in the user's opinion. It is a generic term used quite loosely to define various structures which fail to embody patentable discoveries.

To illustrate, it is used when a mechanism with a series of independent units which perform their functions separately and uninfluenced by the action of any other unit is being considered. In other cases, it may be adopted when a mechanism is composed of numerous units, but their selection did not call for the exercise of the inventive faculty. In such a case, the discovery may approach but does not attain the high status of invention.

[15] We believe the better view is to accept the term "aggregation," if used at all, as defining a phase of the general term "non-invention." When claims are considered which are composed of a plurality of elements and their individual or collective selection fails to evidence the exercise of inventive faculty, it is of course not a patentable discovery regardless of whether coaction of elements is present or absent. On the other hand, an inventive concept may reside in the selection of a part or parts of numerous old elements. If the selection is unusual and a hitherto pressing unsolved problem is thereby overcome, it answers the tests of the statute.

[16] Invention may be evidenced by the modifying coaction of the elements. That is, the coaction may furnish the satisfactory evidence of the patentability of the discovery. It is hardly logical, however, to say without it (coaction) there can be no invention.

It is one who "has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new or useful improvements thereof, etc.," who is, under the statute, entitled to the name inventor, and under prescribed circumstances is entitled to a patent which will protect his invention. The term "aggregation" is not used. It has been adopted by the legal profession as descriptive of a machine, or composition of matter, etc., that falls short of invention usually because the elements of the composition do not coact.



Courts, too, have recognised it as applicable when the machine or composition of matter falls short of invention, because it manifests the skill of the mechanic rather than the genius of the inventor. This has led to emphasis on the term "coaction" of elements when applied to said composition or machine.

When among the group of elements there is correlation or co-ordination of elements which mutually contribute to the same result, there may be invention, notwithstanding there are many decisions which have arbitrarily announced that patentable discoveries are not present unless there is coaction of elements which results in a new or better product.

We are convinced that where there is correlation, cooperation, or co-ordination resulting in mutuality of achievement of a common purpose and contributing to accomplish a desired result, a patentable combination may well be present. Nor is it proper to say that the correlation or cooperation depends on each element's affecting each of the other elements.

[17] In short, in attempting to restrict aggregation to its proper field, it might be said that a combination is present if there be correlation or co-ordination of elements which mutually contribute to the accomplishment of some result and there need be no interdependency in the sense of one element being dependent on the others for functioning.

We are inclined to go still further and question the wisdom of necessitating the presence of a coaction of parts to constitute a valid combination. True, absence or presence of coaction may bear upon the character of the skill required to solve the problem. It is entirely possible to conceive of a case where the selection of the elements which are to act together to produce a desirable or advantageous result, would invoke the exercise of the inventive faculty. While this view may not harmonise with many of the decisions, and it is not applied in the instant case, it seems to us the more logical one. For when we attempt to distinguish between inventive faculty and the skill of the mechanic, we must admit that the former often finds expression in the selection of the particular element and it is the selection of elements that solved the problem, improved the product, or brought about the desired economies in production costs. Its cooperation, with the other elements may be very limited, —in fact, limited to mutuality of effect or functioning to a common purpose.

*Patentable Novelty of the Butler Apparatus.* Appellant argued as one of its three major grounds for reversal of the decree that the advance or improvement which Butler made over the prior art did not constitute invention, but merely evidenced the skill of a mechanic confronted by an ordinary mechanical problem.

Upon this issue the District Court found squarely against the appellant and in its opinion pointed to the differences between the prior art structures and the Butler apparatus.

We are not convinced that the discovery belongs to the pioneer class. It was an improvement, but not an outstanding advance. Whether that improvement was such as to justify the issuance of a patent may well be and is seriously debated.

[18] We are not impressed by the evidence of wide and popular acceptance of the patented apparatus which is so controlling in doubtful cases. *Wahl Clipper Corp. v. Andis Clipper Co. (C.C.A.) 66 F.(2d) 162.*

Appellee occupies such a position in this lubricating field that any lubricating system it might offer to the garages and automobile manufacturers would result in enormous sales of parts. There is no doubt but that the figures appearing in the court's findings, standing alone, are impressive. A sale of 280,000,000 fitting parts in three years, by any company at any time, is quite startling. They would be more impressive if we knew how many parts were sold under the Zerk patent or under the Gullborg patent, both owned by appellee. The number of automobiles in the United States and the number of parts necessary to supply all of them are both enormous. A company, like the appellee, is apparently able to have its product made part of the standard equipment of most automobile companies, and therefore would naturally sell millions of parts of a lubricating system throughout the entire United States. It is for this reason that we have not allowed the sale figures to influence our judgment on this issue of validity of the patent.

It is only after observation of the various lubricating systems that we have come to the same conclusion as was reached by the District Court. If the advance which Butler made was merely the solution of a mechanical problem, we are at a loss to understand why that solution was so long delayed. Holding one part of the lubricating system against another while pressure was applied and grease squirted in all directions, or mak-



ing the connection by the pin and slot or largest type while crawling under cars and reaching between spokes of a wheel, was so unsatisfactory as compared to the Butler method that the delay in producing this new method of connection is explainable only upon the theory that the problem was beyond the solution of the mechanic skilled in the art.

What was the problem which confronted the maker of lubricating systems? First and foremost was the need of high pressure apparatus. The pressure had increased in the passing years. First 500 to 750 pounds was considered high, then 1500 to 2000 pounds. The Butler system permits of pressure up to 7500 pounds. It is apparent that high pressure was extremely desirable. The difficulty to be overcome in the making of a high pressure system was in the connection between the coupler and the pin head. Butler's solution was most satisfactory because the higher the pressure, the tighter the connection—the better the fitting.

Another problem which confronted the manufacturer was easy connection. Crawling under the car or reaching points rather inaccessible was unsatisfactory.

[19] The trial judge found, and there is testimony to support this position, that in the lubricating field the method adopted had never been used before. It was novel in the lubricating field. It may not have been wholly new in the entire field of mechanics, but it was novel in this particular field. Its conception or its selection, under all the circumstances, we conclude was invention and entitled to the protection of a patent.

Appellant argues, as an additional ground for reversal, that claim 2 of the Butler patent and Fig. 2 of the drawings accompanying the same do not cover its accused nipple. It likewise argues that appellee's "Alemite Hydraulic" coupler is not the coupler of the Butler patent.

The District Court found squarely against appellant on this issue.

The question has been elaborately argued both on the oral argument and in the brief. To reproduce the drawings and set forth the positions of the two sides would almost double the length of this opinion, and we fear we would not add much to the statement of our conclusions respecting these conflicting positions.

The question is not whether Fig. 2 of the drawings fully represents the concept of the inventor. Figures which accompany the patents are often presented merely to elucidate the thought expressed in the specifications. Their study is decidedly helpful in most cases, but it can hardly be expected that all of the possible variations in structures will be set forth in specifications or drawings. Frequently the improved type is described in detail. True, there are instances where specificity is necessary in order to distinguish the invention from the prior art. More frequently however, it is the principle of operation which is being illustrated rather than an effort to confine the invention to the exact figures shown in drawings.

This seems to have been the thought of Judge Lindley when he said:

"The Alemite Hydraulic System (appellee's) comprises the combination of elements set forth in claim 2 of the Butler patent. \* \* \* There is nothing in the Butler patent which requires the use of spring fingers which can yield a substantial amount. \* \* \* The Alemite Hydraulic coupler will grip and form a sealed combination with a Lincoln Kleenseal fitting as well as with an Alemite Hydraulic fitting and claim 2 of the Butler patent described one combination as well as the other."

He further stated:

"The mechanism embodied in the means by which the jaws are compressed about the nipple of the Alemite Hydraulic system, is identical in its mechanical principles with that disclosed in the Butler patent. It is a simple equivalent involving a mere reversal of parts. The Alemite Hydraulic system comprises the combination of elements set forth in claim 2 of the Butler patent."

[20] Our conclusion is that such departures from the Butler patent as were made in the commercial structures were nevertheless the equivalent of the Butler claim and they embodied the mechanical principle which were described in the Butler patent. In other words, we agree with the District Court that appellee's Alemite Hydraulic system was an embodiment of claim 2 of the Butler patent.

The decree is  
Affirmed.



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**Excerpts from the Opinions in the 12 Cases Cited in Footnote 4 to the Opinion of the United States Supreme Court in *Bassick v. Hollingshead* and *Rogers v. Alemite*, 298 U. S. 415, 80 L. Ed. 1251.**

The opinion of the Supreme Court in the cases of *Bassick v. Hollingshead* and *Rogers v. Alemite*, 298 U. S. 415, 80 L. Ed. 1251, cites twelve decisions in support of its statement that "as shown by numerous cases in this and other federal courts" one cannot, "in effect, repatent the old combination by reclaiming it with the improved element substituted for the old element" where the "construction and operation is otherwise unchanged."

It will be found that these cited cases were decided against the plaintiffs upon nine different grounds, namely:

(1) Double patenting: *Underwood v. Gerber*, 149 U. S. 224, 227, 229;

(2) Lack of Invention: *Wall Pump & Compressor Co. v. Gardner Governor Co.*, 28 Fed. (2d) 334, 338, 339; *General Electric Co. v. Ohio Brass Co.*, 277 Fed. 917; *Troy Wagon Works Co. v. Ohio Trailer Co.*, 274 Fed. 612;

(3) Anticipation by prior art: *Heald v. Rice*, 104 U. S. 737, 753; *Troy Wagon Works Co. v. Ohio Trailer Co.*, 274 Fed. 612;

(4) That a reissue patent was for a *different* invention from that of the original patent; *Langan v. Warren Axe & Tool Co.*, 184 Fed. 720; *Heald v. Rice*, 104 U. S. 737, 753;

(5) Non-infringement because defendant did not sell any part of the thing claimed in the patent in suit: *Harvey Hubbell, Inc. v. General Electric Co.*, 267 Fed. 564;

(6) That the patentee and purchaser and user of the patentee's machine contemplated that the purchaser might



replace quickly perishable and periodically renewed parts or supplies: *Morgan Envelope Co. v. Albany Perforated Wrapper Paper Co.*, 152 U. S. 425, 431, 432; *Wagner Type-writer Co. v. Webster Co.*, 144 Fed. 405, 409;

(7) That the defendant had been impliedly licensed by the patentee: *Edison Electric Light Co. v. Peninsular Light, P. & H. Co.*, 101 Fed. 831;

(8) That a patentee may not exact as the condition of a license, that unpatented materials used in connection with the invention shall be purchased only from the licensor: *Carbice Corporation v. American Patents Development Corporation*, 283 U. S. 27, 31, 32. (Upon a rehearing the patent in suit was held to be invalid because anticipated, 283 U. S. 420.)

(9) That it was a violation of the Clayton Act for the Radio Corporation to require its licensees to purchase radio tubes from it alone for inclusion in sets licensed under Radio Corporation circuit patents as initial equipment: *Radio Corporation v. Lord*, 28 Fed. (2d) 257.

## CASE NO. 1.—CITED BY THE SUPREME COURT.

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*John T. Underwood, et al v. Henry Gerber, et al.*, 149 U. S. 224—Decided May 1, 1893—Opinion by Mr. Justice Blatchford.

In this case the patent in suit was held void on the ground of double patenting.

Suit was brought on patent No. 348,073 for Carbon Paper consisting of a sheet of material coated with a specific composition. Carbon paper consisting of a sheet of material coated with various compositions was old and well known. The specific composition was separately claimed in patent No. 348,072, also owned by the plaintiffs but not in suit.

The court indicated that the specific composition claimed in patent No. 348,072 was new and that if suit had been brought on this patent, a different result would have been reached. The court, however, held that the specific composition claimed in the earlier patent must be considered prior art, and held the patent in suit to be void thereover. The court said, at page 331:

“As No. 348,073 does not claim the composition of matter, although it describes it, that composition must be regarded as disclaimed, and as being public property, and there was no invention in applying it to paper, as claimed in the patent sued on.”

## CASE NO. 2—CITED BY THE SUPREME COURT.

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*Wall Pump & Compressor Co. v. Gardner Governor Co.*,  
28 Fed. (2d) 334, 338, 339. (C. C. A. 7—Sept. 13, 1928—  
Alschuler, C. J.)

This case involved a patent on a two stage air compressor for use in supplying air for automobile tires. The court found the patent to be invalid, citing numerous anticipations. It was argued that none of the citations constituted anticipations, because they did not possess radiating flanges of the patent in suit. As to this, the court said:

“What we have said sufficiently indicates our view that invention is not involved in so equipping such a conduit or receptacle. The presence or absence of such well known radiating expedients, or the number or depth of such fins, involves engineering or mechanical judgment and skill, but to no degree invention.”

The gist of the decision, however, is contained in the following excerpt from the opinion, appearing on page 339:

“It is of much significance here that about the same time several important builders of such machines—without relation to each other, and, so far as the evidence discloses, without knowledge of what Gardner or the others were doing—designed and built machines which substantially embody the elements of the patent, without themselves claiming to be inventors. Such a situation is instructively dealt with in section 25 of *Walker on Patents*, where it is stated:

“The absence of invention may be established in some cases, by evidence that a considerable number of persons who were not inventors, acting independently of each other, and without receiving any information from the patentee or his patent, did in fact contrive the improvement claimed therein, not long after he produced it.”

“Also, in *Concrete Appliances Co. et al. v. Gomery*,

*et al.*, 269 U. S. 177, at page 185, 46 S. Ct. 42, 45 (70 L. Ed. 222), the court said:

“ ‘The adaptation independently made by engineers and builders of these familiar appliances to the movement and distribution of wet concrete in building operations and the independent patent applications, within a comparatively short space of time, for devices for that purpose are in themselves persuasive evidence that this use in combination of well known mechanical elements was the product only of ordinary mechanical or engineering skill and not of inventive genius. *Atlantic Works v. Brady*, 107 U. S. 192 (2 S. Ct. 225, 27 L. Ed. 438).’

“We believe that the circumstances of the instant case invoke the application here of the principle thus stated, and give yet another reason for concluding, as we do, that the bringing together of the various elements of the claims manifests not invention, but only the exercise of such mechanical and engineering skill as might reasonably be expected in those versed in this department of endeavor.”



### CASE NO. 3—CITED BY THE SUPREME COURT.

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*General Electric Co. v. Ohio Brass Co.*, 277 Fed. 917.  
(C. C. A. 3, Jan. 6, 1922—Woolley, C. J.)

The Buck and Hewlett patent in suit was for a system of electrical transmission. Claims 2, 3, and 4 covered the combination of poles, electrical conductors, and insulators supporting the electrical conductors and flexibly connected to the poles. The court found that this combination was anticipated by a prior use in Indianapolis, and that these claims were accordingly void.

Claim 6 covered the same combination, but required that the insulator be of the specific type disclosed in a patent taken out by Hewlett alone. The Hewlett patent was not in suit.

The court found that claim 6 of the Buck and Hewlett patent in suit described nothing more than the usual and necessary combination in which the insulator of the Hewlett patent was designed to be used, and that the claim was accordingly void for lack of invention. The court said, pages 923-926:

“On this issue (of invention) the complainant concedes that, with qualifications, all elements of the combinations of the claims in suit are old. Therefore, it is certain that invention, if any, must be found in the combinations alone. *Leeds & Catlin v. Victor*, 213 U. S. 325; 332, 333, 29 Sup. Ct. 503, 53 L. Ed. 816. We understand that the complainant does not deny that the combinations themselves were, in their essentials, found in systems of lower potentials and in systems of higher potentials, the formers exemplified by railways and the latter by wireless telegraphy.”

“But the complainant says the Indianapolis system was of low potential. It was, relatively so. Yet its

problems, electrical and mechanical, were different only in degree from those in a system of high potential. That difference is cared for by insulators and their related expedients. But if it were not, still we fail to discern invention in the mere adaptation of this Indianapolis system of low potential to the complainant's system of high potential.

"We are of opinion, therefore, that within the general description of the element of an insulator, the invention of the patent in suit was anticipated. On this ground, as well as on the ground which will control our decision on claim 6, we hold claims 2, 3 and 4 invalid. It follows on the same evidence that claim 1 is invalid.

"As the insulator in the combination of claim 6, particularly described in the specification and displayed in the diagrams, is the insulator of the Hewlett patent, or an insulator distinctively of its type, we have the question whether the Hewlett insulator, or one falling within its description, can in combination with common expedients of the art be the subject of invention.

"Turning to claim 6, we find, as we have said before, the invention to be a combination of three elements: First, towers provided with cross-arms; second, an electric conductor; and, third, disc insulators flexibly connected in series supporting the conductor, thereby producing as a result its free suspension. 'Towers provided with cross-arms' were not new. At any rate they are the equivalent of poles with cross-arms. Poles with cross-arms are an expedient of the art as old as the art itself. Current conductors, of course, are an expedient as old as poles. The only other element is the insulator, and that insulator is intended for use only in suspended connection between cross-arm and conductor. Thus there is a combination which embodies a specific element of suspended insulator in assemblage with expedients of the prior art, which together produce no function other than that which the suspended insulator would itself produce when in operation with these ordinary expedients of the art.

"The insulator described in claim 6, whether specifically the insulator of the Hewlett patent or generally an insulator of the Hewlett type, is adapted for both horizontal dead-ending insulation and for suspension insulation. Whether used for one purpose or the

other, or for both purposes, such an insulator in overhead suspension can be used—so far as we have been shown or can imagine—only in connection with the very expedients of the art named as elements of the patent combination. At least, claim 6 discloses use of the insulator only with these expedients. There must be a tower or pole with a cross-arm from which to suspend the flexible insulator at one end and a current conductor to be appended to the insulator at its other end. Without these two expedients the insulator cannot work. This being true, can there be invention in a combination of three elements, when two of them, separately free to everyone, are indispensable to the functioning of the third? Or, stated differently, is there invention in a combination which produces no result other than that produced by one of its elements operating in the only way possible for it to operate—that way being through expedients common to the art? Reading claims 6, 2, 3 and 4,—all combinations,—we find, described as an element in each, an insulator of a specific type (claim 6), and an insulator of a more general type (claims 2, 3 and 4), in combination with expedients appropriated from the art without which insulators of neither type can function. The complainant says here is invention. With this we cannot agree because: First, we do not find a combination which in the patent sense is new. Nor can we find such a combination useful beyond that of the insulator itself with the expedients of the art open to it—expedients without which the insulator is useless. If such a combination constitutes invention, then, if patented, use of the common expedients of the art—poles and conductors—would be foreclosed to every one seeking lawfully to use insulators of their own which happen to fall within the class of the insulator elements of the claims. Of such insulators there are numbers patented and extensively used in the art.

“As drawn, the patent to Buck and Hewlett grants them not merely a monopoly of a system of electrical transmission, but, in effect, expands the Hewlett patent for an insulator and permits it to embrace and monopolize, the named expedients of the art, thereby bringing about infringement whenever these expedients are used in combination with insulators of others, which, though not infringing the Hewlett insulator,

fall within its broad description. The Buck and Hewlett patent for a system, built around the Hewlett insulator, pretty nearly, if not entirely, covers the whole art, present and perspective, of insulators in series flexibly connected, whether the insulating members be discs, globes, or other shapes.

"We are constrained to hold the claims of the patent in suit invalid and direct that the decree below dismissing the bill be affirmed."



## CASE NO. 4—CITED BY THE SUPREME COURT.

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*Troy Wagon Works Co. v. Ohio Trailer Co.*, 274 Fed. 612 (C. C. A. 6—July 27, 1921—Donahue, C. J.).

This suit involved two patents, one a patent to Hudson for improvement in steering mechanism adapted to trailer trucks, and the other a patent to Eccard & Smith, relating to an improvement in reversible trucks or dump wagons, and claiming a combination of draft bar and automatic locking device. Both patents were held to be invalid for want of invention.

The Hudson patent for steering device was held to be anticipated by various steering mechanisms in the automobile art. The chief argument apparently on appeal was that the automobile art was not analogous to the trailer art. The court held, however, that if it was not in the same art, it was at least in a closely analogous art, and held the patents in the automobile are to be good anticipations.

The court likewise held the Eccard & Smith patent to be anticipated by prior patents in the automobile and agricultural implement arts.

The court further held that the automatic lock of the Eccard & Smith patent performed precisely the same function that automatic locks had performed long prior thereto, and that there was therefore no new result from combining an automatic lock with the old steering elements of vehicles, and that consequently the patent did not involve invention. The court, on pages 618-621 of the opinion, said:

"The Eccard & Smith patent, No. 1,117,816, relates to improvements in reversible trucks or dump wagons of the type which employ a pivoted draft bar at each end thereof, which draft bar is connected to the wheels for steering purposes, and also may be locked to the wagon

bed or frame in a central position when the truck is being drawn from the opposite end. Claims 6, 7, and 8 are relied upon by the appellant. These claims are similar in their nature; claim 8 being, perhaps, a little more comprehensive than either of the other two. This claim reads as follows:

'8. In a vehicle of the character described, a main frame, a draft bar pivotally connected to said main frame at its rear end, an automatic latch for locking said draft bar to said frame near its front end in a central position with respect to said main frame, said draft bar having connections with the steering wheels of said vehicle, and means for holding said latch in inoperative position to permit said draft bar to steer said wheels.'

"There are other claims describing this automatic locking device in detail, but it is not seriously contended that the automatic locking device used by the defendant is an infringement of appellant's automatic locking device, separate and apart from the combination in which it is found. On the contrary, it is the specific claim of the appellant that the invention lies in the combination and not in the lock *per se*, and that therefore the introduction of any automatic locking device into this combination described in the specifications and claims, co-ordinating in like manner as appellant's automatic lock with the other elements of the combination, would constitute infringement.

"In reply to this it is insisted upon the part of the appellee that there is nothing new or novel in appellant's combination, for the reason that automatic locks for locking the draft bar of vehicles of the character named in the patent in suit and other wheeled vehicles of a similar nature are old in the prior patent art. In support of this contention a large number of patents relied upon by appellee are cited. The steering mechanism of a trailer truck or dump wagon, that is associated in this combination with appellant's automatic locking device, is admittedly old in the art. Nor is there anything new or novel in the idea of locking the rear draft bar to the wagon bed or frame in a central position when the truck or wagon is being drawn from the opposite end. On the contrary, this is absolutely essential to its successful operation. Nelson, 793,799; Geiger, Eccard & Southerland, 903,185; Chrestenson, 1,068,737.

"However, in these patents no automatic lock is used; but the locking is accomplished, as stated in the application for this patent, by the insertion of a pin or other means through suitable apertures through the draft bar and some parts connected with the vehicle body.

"Souther, 207,453, relates to a reversible trailer truck for street cars. It appears from the evidence of the expert witness Browne, and also from an examination of this patent itself, that it contains fundamentally the same character of locking mechanism used by the defendant, which consists of two latches, which co-operate directly with a hump or boss on the drawbar. Souther has two pivoted latches, which, when released by pressure of the foot of the driver, permits the drawbar to swing free, but when it comes back to a central position it is again automatically locked.

"The expert witness called on behalf of the appellant testifies in reference to this patent that the action is automatic in closing, but there are no means for holding the lock out of operation except the foot of the motorman; that, because this feature is lacking, Souther's automatic lock would not be suited for use in a trailer. It is clear, however, that the idea of the automatic lock as applied to the steering mechanism of a trailer truck is fully disclosed by Souther, and that the mechanical means for holding this lock out of operation was not used, because an operator was always present on these trailers, and for that reason no such device was necessary. Therefore the most that Eccard & Smith could claim over Souther is this means for holding the automatic locking device out of operation when it is desired that the draft bar should swing free, but this is also old in the art.

"In the Eccard & Smith patent it is also necessary for the operator to use his hands in placing the means provided for fastening their automatic lock in such position that it will not function.

"Knupfer, 410,692, is for a seed-drilling machine, having an automatic locking device, which consists of a bolt actuated by a spring, which corresponds with a notch carried by the drawbar, so that when the spring bolt is free to move, and the notch is brought into register with the bolt, the tongue or drawbar will be

automatically locked in central position. It is also provided with means for holding this automatic locking device out of operation. While this machine is being used in the field in the drilling of grain, it is desirable that the tongue or draft bar should swing freely, and therefore the lock is not released or used in the actual operation of the machine, except in turning a corner, or in moving the machine on the road, or from one field to another. It then becomes necessary that the tongue should be so locked to the body as to provide a steering means other than the mere draft. To that end the automatic locking device is released, and functions as in Eccard & Smith, to lock the tongue or draft bar in rigid relation to the frame or body.

"In any event, it is clear that Souther and Hurd are within the identical art, although Hurd is not of the reversible type, or of a type that requires the rear wheels to be rigidly locked to the frame or body of the vehicle when drawn from the opposite end. Nevertheless the Hurd invention relates to substantially the same problem in the same art as Eccard & Smith. It is also apparent that agricultural implements, including a frame mounted upon wheels, with tongue or draft bar connected with and used as part of its steering mechanism, if not in the same art, are at least in such a closely allied art that prior patents in relation thereto must necessarily be held as anticipatory of similar inventions in relation to reversible vehicles described in Eccard & Smith, whether motor-drawn or horse-drawn trucks or dump wagons.

"It is further insisted, however, that, even though these patents were in the same or an analogous art, they have no application, for the reason that the automatic locks shown in the earlier patents are not found in the same combination as in Eccard & Smith, and that the Eccard & Smith patent is for a combination, and not for an automatic lock *per se*. The mere adaptation of an old element to a specific use is not invention, unless the combination of such old elements produce 'a new result, or an old result in a new and materially better way.' *Frey et al. v. Marvel Auto Supply Co.* (C. C. A. 6) 236 Fed. 916, 150 C. C. A. 178. It is clear from the evidence in this case that the auto-



matic locking device of Eccard & Smith functions in identically the same way as the automatic locking devices in the prior patent art, and that the other elements of this combination produce no new or different result in combination with this automatic locking device than produced by these elements when locked by any other means. It necessarily follows that the combination of an automatic lock with the old steering elements of vehicles of the character described in this patent does not constitute invention. *Heald v. Rice*, 104 U. S. 737-755, 26 L. Ed. 910; *Huebner-Toledo Breweries Co. v. Mathews*, 253 Fed. 435-447, 165 C. C. A. 177; *Turner v. Lauter Piano Co.*, 248 Fed. 930, 161 C. C. A. 48; *Robinson v. Fabric Co.* (D. C.) 248 Fed. 526; *Overweight Counter-balance Elevator Co. v. Machine Co.*, 102 Fed. 957, 43 C. C. A. 80; *Self Sealing Can Co. v. Hocker* (C. C.) 136 Fed. 418; *Warren Webster & Co. v. Dunham*, 181 Fed. 836, 104 C. C. A. 346.

“Therefore, even if Knupfer were to be entirely disregarded, the combination of these old elements including adequate means for holding the automatic locking device out of operative engagement, does not amount to invention, even though that means may be in and of itself new and novel, and entitled to separate and distinct patent protection or protection in combination with these old elements as to that peculiar or novel means employed for that purpose but certainly not as a monopoly covering such combination with any and all forms of automatic locks.

“For the reasons above stated, the decree of the District Court as to both patents is affirmed.”

**CASE NO. 5—CITED BY THE SUPREME COURT.**

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*Heald v. Rice*, 104 U. S. 737, 753. (October, 1881—Opinion by Mr. Justice Matthews.)

This suit was brought upon a reissue patent to Rice, which the Supreme Court held void because it was not for the same invention as the original patent, and also because it was anticipated by earlier patents.

“It appears, then, from the mere reading of the two specifications, that the invention described in the first is for the return-flue boiler; while that described in the second, abandoning the claim for the boiler itself, is for a particular mode of using it, with straw as a fuel, by means of an attachment to the furnace door for that purpose. It might well be that Rice was entitled to patents for both, separately, or to one for both inventions. But it is too plain for argument that they are perfectly distinct. A patent, consequently, originally issued for one, cannot lawfully be surrendered as the basis for a re-issue for the other. . . .

“The second principal objection to the validity of the Rice re-issued patent is, that it is anticipated by the Morey patents. We are of opinion that it also is well taken.”

**CASE NO. 6—CITED BY THE SUPREME COURT.**

*Langan v. Warren Axe & Tool Co.*, 184 Fed. 720 (C. C. A. 3, Feb. 2, 1911—Lanning, C. J.)

The patent in suit involved an alleged improvement in grab hooks employed in skidding logs, and claimed a combination of the grab hooks with draft appliances.

The patent as originally filed and as issued, described in the specification only the grab hooks themselves, and stated that in use they were connected by links or chains to the usual draft appliance. The specification expressly stated that the invention consisted in the particular and peculiar form of hook described therein.

The six claims contained in the application as filed, were all limited to the particular grab hook itself. These claims were all rejected and the patentee acquiesced therein, and substituted a single claim claiming a combination of the particular grab hooks with a draft appliance.

The suit was not one for contributory infringement, but charged direct infringement. At the trial, counsel for plaintiff conceded that the real invention lay in the grab hooks themselves, and attempted to have the patent so interpreted. The court, however, held that there was a Patent Office estoppel because of the patentee's acquiescence in the rejection of the claims for the grab hooks themselves, and that the claim was therefore one for a combination, and that so read, it lacked invention. The opinion reads in part, pages 721-722:

"It will be observed that in this specification, which, except as to one or two verbal corrections, is in the same form as when the application was first filed in the Patent Office, there is no suggestion that any part of the patentee's invention resides in a combination of the grab-hooks and the draft appliance. The connection between the grab-hook and the draft appliance by

means of links or chains is mentioned, but such connection was as old as grab-hooks themselves, and the patentee expressly states that his invention consists, not in any such combination, but 'in the particular and peculiar form of hook herein described and pointed out in the claim.'

. . . . .

"Not only is the claim for a combination foreign to what is set forth in the specification, but there is no new coaction or co-operation of the elements of the combination. The grab-hooks and draft appliance of the patent, in combination, coact as grab-hooks and draft appliances have always done. The grab-hook of the patent, by reason of its peculiar construction and form, is very probably an improvement of no little utility. But the patentee cannot, merely because of that fact, have a patent for a combination which shall have, as one of its elements, a pair of such grab-hooks. He did not invent the combination. He invented, if he invented anything, an improved grab-hook. Indeed, this is conceded by the patentee's counsel, and he argues that because the patent examiner, when the original claims were before him, said 'claim 6 is incomplete without the links, and the eye in the end of the shank is useless without the other elements,' the claim as it now stands should be construed as one describing, as the real invention, a specific form of grab-hook. Manifestly, we cannot so construe it. The claim is for a combination of grab-hooks, of a peculiar form, and a draft device. We are not at liberty to distort its plain language. It may be, as the patentee's counsel declares, that the criticisms of the examiner led to the present form of the claim. But if the examiner's criticisms were unsound, the patentee could have had them reviewed by an appropriate appeal. This is not a case where there was a mere change of phraseology to suit the views of an examiner. The structure of the claim was remodeled in a fundamental respect. It was changed from a claim for an improved grab-hook to a claim for a combination of an improved grab-hook and a draft device. We are therefore compelled to read the claim as one for a combination, and not for an improved grab-hook. So read, it is clear that there is no error in the decree of the Circuit Court.

"The decree is affirmed, with costs."



## CASE NO. 7—CITED BY THE SUPREME COURT.

*Harvey Hubbell, Inc. v. General Electric Co.*, 267 Fed. 564. (C. C. A. 2—May 26, 1920—Hough, C. J.)

This suit involved two patents, one covering a plug for an electrical connection comprising a combination of specific elements, and the other a combination of the plug with a cap of specific construction. Both patents were found to be not infringed, as necessarily limited by the prior art and their prosecution in the Patent Office. With reference to the first patent, the court said, at page 570:

"The applicant was compelled to redraft the claim, so that it reads as at present, and plainly requires the contact posts to pass through guide holes before engaging the contact locking springs in the recesses. It was this provision of an approach through insulated material that was required by the Office and yielded to by the applicant, and that acquiescence procured the allowance of the patent. \* \* \*

"There is not a single one of the above enumerated alleged infringing articles of which this is true. \* \* \*

"It follows that there is no infringement of claim 1 of the senior patent, and it becomes unnecessary to determine whether that claim is invalid, if confined, as it must be, to the exact device described and depicted."

As to the second patent in suit, the court also found non-infringement, saying, at page 572:

"There was no novelty per se in the use of knife blade contacts. They had been commercially used in the Ft. Wayne-Jenney construction, and known at least since 1886. Nor was there inventive thought in securing a locking, as distinct from a frictional, engagement between contact post and current carrying spring. That was old, and is found in the senior patent, if nowhere else. The field of invention left open and occupied by Hubbell was to secure a notched or recessed blade by a supplementary spring, and this he did. That is the only idea validating the locking spring claims, and defendants do not employ that means."

The court further held in this case that in any event there would have been no contributory infringement of these patents by defendant, because it did not sell its caps with the intent that they be used with the plaintiff's plug.

## CASE NO. 8—CITED BY THE SUPREME COURT.

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*Morgan Envelope Co. v. Albany Perforated Wrapper Paper Co.*, 152 U. S. 425. (Mar. 19, 1894—Opinion by Mr. Justice Brown.)

This case involved two patents; one covering a package of toilet paper of particular form, and the other involving the combination of the paper roll with a mechanism for delivering it in an economical manner. The paper rolls patent was held to be so limited by the prior art that it was not infringed by the paper roll sold by the defendant. The court further held that the combination patent was not contributorily infringed by defendant's sale of paper rolls for use with plaintiff's delivery mechanism inasmuch as the paper element of the combination was perishable in its nature and intended by the manufacturer to be renewed periodically. The court said, pages 432-433:

"The real question in this case is, whether, conceding the combination of the oval roll with the fixture to be a valid combination, the sale of one element of such combination, with the intent that it shall be used with the other element, is an infringement. We are of opinion that it is not. There are doubtless many cases to the effect that the manufacture and sale of a single element of a combination, with intent that it shall be united to the other elements and so complete the combination, is an infringement. *Saxe v. Hammond*, Holmes, 456; *Wallace v. Holmes*, 9 Blatchf. 65; *Barnes v. Straus*, 9 Blatchf. 553; *Schneider v. Pountney*, 21 Fed. Rep. 399. But we think these cases have no application to one where the element made by the alleged infringer is an article of manufacture perishable in its nature, which it is the object of the mechanism to deliver, and which must be renewed, periodically, whenever the device is put to use."

**CASE NO. 9—CITED BY THE SUPREME COURT.**

*Wagner Typewriter Co. et al. v. F. S. Webster Co.*, 144 Fed. 405. (C. C. S. D. N. Y., March 28, 1906—Ray, D. J.)

In this case, the plaintiffs owned a patent for a ribbon mechanism for typewriters. There was a single combination claim including a pair of disconnected ribbon spools. The Court found that such ribbon spools needed frequent replacement in the normal life of the typewriter, and that the defendant might make and sell ribbons wound on spools which would fit any typewriter on the market.

The basis for the decision is clearly set forth in the following excerpt taken from page 416 of the printed decision:

“ \* \* \* I hold with Judge Thomas that an unpatented element of a patented combination may be replaced by the purchaser of his own authority when its use upon external objects must work its early destruction (and such is this case as to a spool with a ribbon); when in the arrangement of an element, not the chief element, it is so fashioned and placed as to be specially subject to external forces that make it peculiarly liable to breakage or wear; when it is not the chief part of the combination (and that is this case); when it is an ordinary working part (and such is this case); and I will add when it is not a vital element of the combination, or a chief part of it, and is easily removable and replaced without affecting the identity of the machine, and it is a natural inference that it was contemplated by the patentee and purchaser and user that such part should be removed and replaced from time to time, and the part is in general use and extensively made and sold by others.”

This case falls, therefore, in the same category with *Morgan Envelope Co. v. Albany Paper Co.*, 152 U. S. 425.

## CASE NO. 10—CITED BY THE SUPREME COURT.

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*Edison Electric Light Co. et al. v. Peninsular Light, Power & Heat Co. et al.*, 101 Fed. 831 (C. C. A. 6, May 8, 1900—Lurton, C. J.)

The decision in this case rested squarely upon a finding by the Court of an implied license resulting from the conduct of plaintiffs. One of the plaintiffs, a licensee of the Edison company, in order to introduce electric service, had wired at cost a hotel which was under construction. The type of installation, a three-wire system, was covered by a patent owned by the Edison company. The wiring was permanently installed in the building. The hotel bought electricity for six years from the licensee-plaintiff; then later bought current from the defendant, Peninsular Light Co., which installed transformers in the hotel, and after an unsuccessful attempt to use its own noninfringing three-wire system, used the wiring peculiar to the Edison system for its outside connections. The plaintiffs brought suit against the Peninsular Co. and another power company, alleging contributory infringement of the Edison patent. Dismissal of the bill by the trial court was affirmed, the Court of Appeals saying, at pages 836 and 837:

"It is evident that the extent of an implied license must depend upon the peculiar facts of each case. The question in each case is whether or not the circumstances are such as to estop the vendor from asserting infringement. \* \* \* The circumstances in this record plainly indicate that the vendors of the house apparatus installed in the Livingston Hotel intended that the vendees should enjoy the advantages of the Edison system of electrical distribution. The machine it constructed was peculiarly adapted for the use of Edison's inventions, and, as we interpret the



facts and circumstances of the record, is not capable of safe use under any other plan or system. If it was intended that so expensive an apparatus could be utilized according to the methods of the patents under which the vendor was operating only so long as the vendor should supply the current, good faith required that the vendees should be plainly so informed. It cannot be doubted but that the vendees understood they were securing a permanent wiring system, which might be used in combination with a current obtained from any source, delivered to the house wires in such manner as to utilize them to the best advantage. It would be most unreasonable to suppose that in order to continue the use of this, the very essence of the Edison inventions, they must continue to take current from a particular source."

## CASE NO. 11—CITED BY THE SUPREME COURT.

*Carbice Corporation of America v. American Patents Development Corporation et al.*, 283 U. S. 27. (Mar. 9, 1931—Opinion by Mr. Justice Brandeis.)

This case involved a patent on a refrigerating transportation package employing solid carbon dioxid as the refrigerating medium. The carbon dioxid was itself unpatented. The plaintiff neither sold nor licensed others to sell the complete transportation package of the patent in suit, but sold merely the carbon dioxid as did also the defendant. In this suit to enjoin defendant's sale of unpatented carbon dioxid, the court denied relief to the plaintiff. The gist of the whole decision is stated at pages 30 and 31, as follows:

"The Carbice Corporation challenges the validity of the patent and denies infringement. Whether the transportation package described is a patentable invention we need not determine. . For, even if it is, no relief can be granted.

"The invention claimed is for a particular kind of package employing solid carbon dioxid in a new combination. If the patent is valid the owner can, of course, prohibit entirely the manufacture, sale, or use of such packages. *Continental Paper Bag Co. v. Eastern Paper Bag Co.*, 210 U. S. 405, 52 L. ed. 1122, 28 S. Ct. 748. Or it can grant licenses upon terms consistent with the limited scope of the patent monopoly. *United States v. General Electric Co.*, 272 U. S. 476, 489, 71 L. ed. 362, 370, 47 S. Ct. 192. It may charge a royalty or license fee. But it may not exact as the condition of a license that unpatented materials used in connection with the invention shall be purchased only from the licensor; and if it does so, relief against one who supplied such unpatented materials will be denied."

CASE NO. 12—CITED BY THE SUPREME COURT.

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*Radio Corporation of America v. Lord et al.*, 28 Fed. (2d) 257. (C. C. A. 3, Sept. 11, 1928—Opinion by Davis, C. J.)

This case was a suit under the anti-trust laws charging defendant with having caused damage to plaintiff by violation of the anti-trust laws as a result of its license contract with various radio manufacturers. No question of patent infringement was involved. Plaintiff charged, and the court held, that Radio Corporation, by requiring its licensees to purchase radio tubes from it alone for inclusion in sets licensed under Radio Corporation circuit patents as initial equipment, had made a contract for a sale of goods on a condition or understanding that the purchaser would not use or deal in the goods of a competitor and, therefore, violated the Third Section of the Clayton Act. The defendant asserted in defense that the license was not a violation of the anti-trust laws but was merely an exercise of its lawful rights of monopoly granted it under the patent laws. The court held, however, that there was no patent protection on radio tubes per se, as the patents upon the tubes had expired, and as the tubes constituted only one element of a combination patent, there was, therefore, no lawful monopoly in the tubes separate and apart from the combination itself. There is no finding or intimation in the opinion of the majority that an unlicensed seller of radio tubes with the intent that they be included in the patented combinations could not be sued as a contributory infringer by Radio Corporation. Circuit Judge Buffington dissented.

The part of the opinion dealing with the patent phase of the case reads as follows, page 260:

"A patentee, the defendant says, has the exclusive right to make and sell to licensees, for their use in completing the licensed apparatus manufactured by it, any element of the patented combination, even though that element is old and free from patent monopoly. The learned District Judge, on the authority of the case of *United Shoe Machinery Corp. v. United States*, *supra*, overruled this contention. A licensed combination need not consist of separate patented elements, each of which is entitled to individual patent monopoly. It is the new combination that the law protects. Some of the elements may be new, and patented, and others old, on which patents have expired, or never patented. Of course, the law protects the individual patented elements, as well as the new combination composed of new and old elements. In such cases the patentable novelty consists in bringing together these new and old elements into a new combination, and not in the patentability of each element. *Goss Printing-Press v. Scott* (C. C. A. 3) 108 F. 253; *United States v. American Bell Tel. Co.*, 167 U. S. 224, 249, 17 S. Ct. 809, 42 L. ed. 144; *Leeds & Catlin v. Victor Talking Machine Co.*, 213 U. S. 325, 29 S. Ct. 503, 53 L. Ed. 816.

"A single old element, whose patent monopoly has expired, cannot be put into a new patented combination as a constituent element, and thus have its individual monopoly revived for 17 years more. This would be a new method of securing a patent, or a means of evading the patent law, by doubling the length of the life of a patent. A patent may not be secured on a single element by inclusion. The vacuum tubes are an element in the electrical circuits licensed under the contracts. It is these circuits, as such, and not the single unpatented elements, that are protected. While the defendant has the exclusive right to manufacture, lease, and sell the combination, it does not have the right to withhold from the manufacture, use, and sale by others a single one of the elements, composing the circuits, which is no longer protected by a patent. In other words, a patentee may not prevent the individual manufacture, use, and sale of a single unpatented element, which the world is free to make,



use, and sell, by simply including it as an element in a new patented combination. To put it differently, the inclusion in a patented combination of an unpatented element does not give the patentee of the combination a monopoly of each element, and the exclusive right to make, use, and sell that element, **independent of the combination.** So long as the patent covering vacuum tubes was in existence, the patentee of this element of the combination was protected, and it could not be included in the combination without a license to do so; but, when the patent on this tube element expired, the rights, which were theretofore vested in the patentee, became the property of the public, and not of the patentee of the combination." (Emphasis ours.)



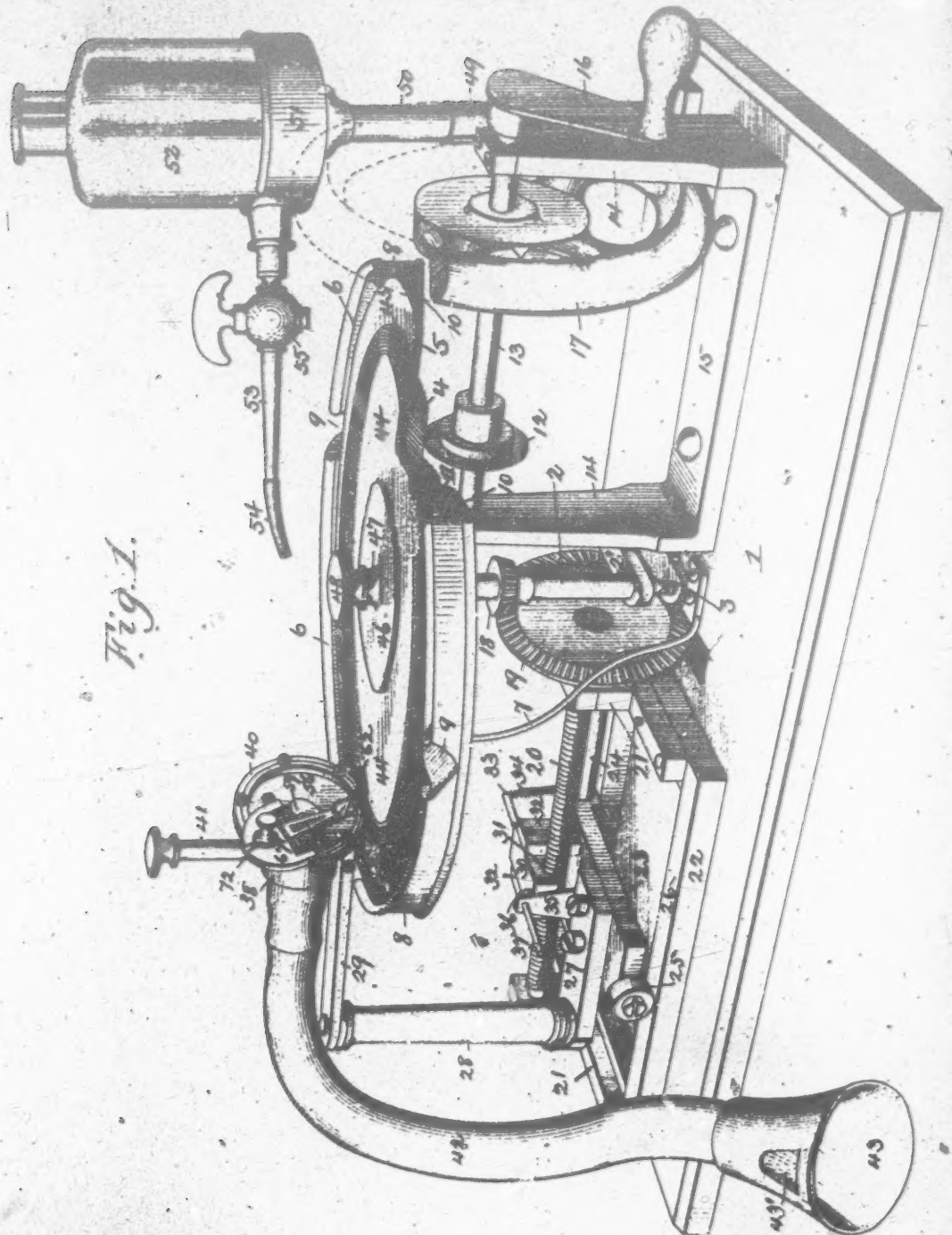
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4 Sheets—Sheet 1.

E. BERLINER.  
GRAMOPHONE.

No. 534,543.

Patented Feb. 19, 1895.



Witnesses;  
 Rex C. Bowen,  
 F. T. Chapman.

Inventor:  
Himile Berliner,  
By Joseph Lyons.  
Attorney.

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(No Model.)

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E. BERLINER.  
GRAMOPHONE.

No. 534,543.

Patented Feb. 19, 1895.

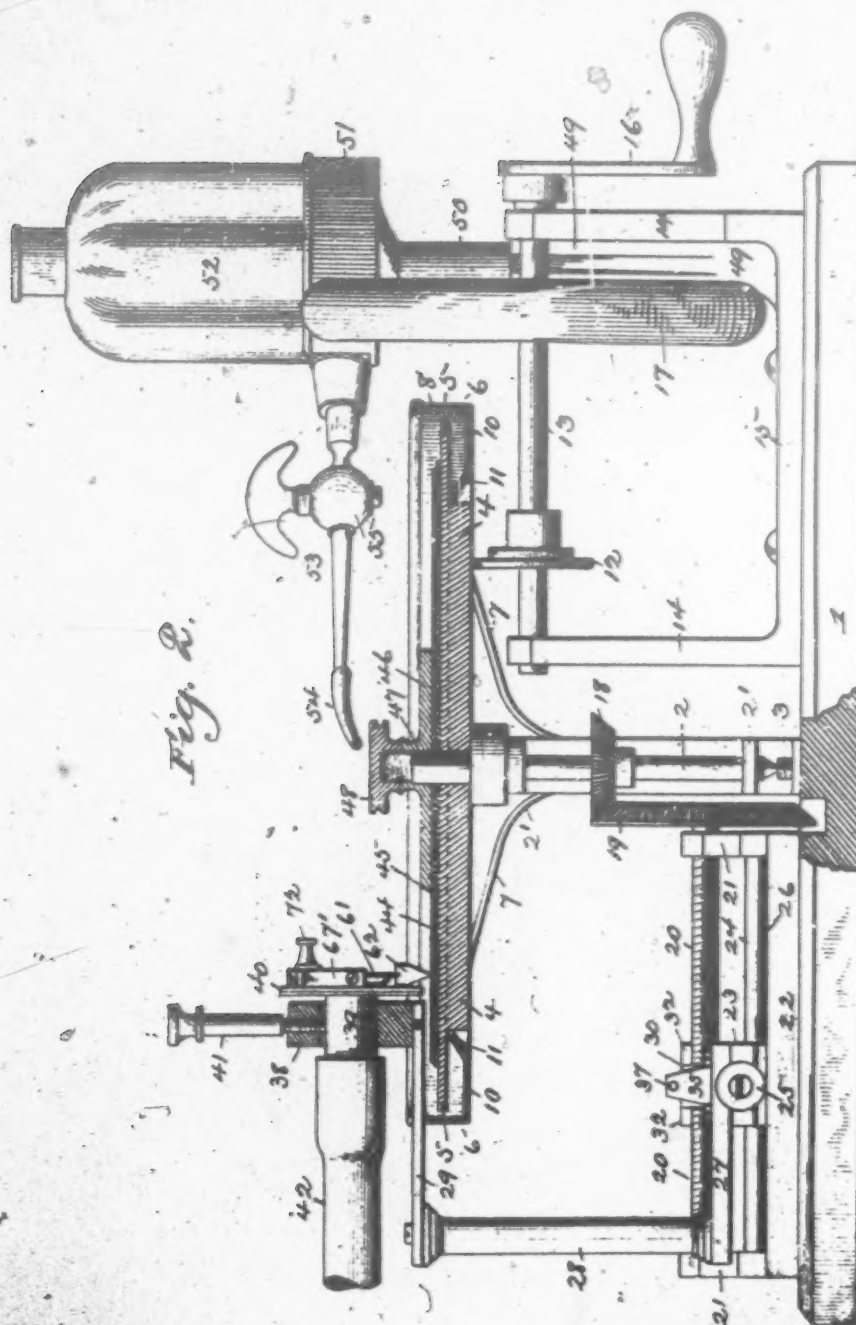


Fig. 2.

Witnesses:  
J. M. Giv.  
F. J. Chapman

Inventor,  
Emile Berliner,  
By Joseph Lyons,  
Attorney

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E. BERLINER.  
GRAMOPHONE.

No. 534,543.

Patented Feb. 19, 1895.

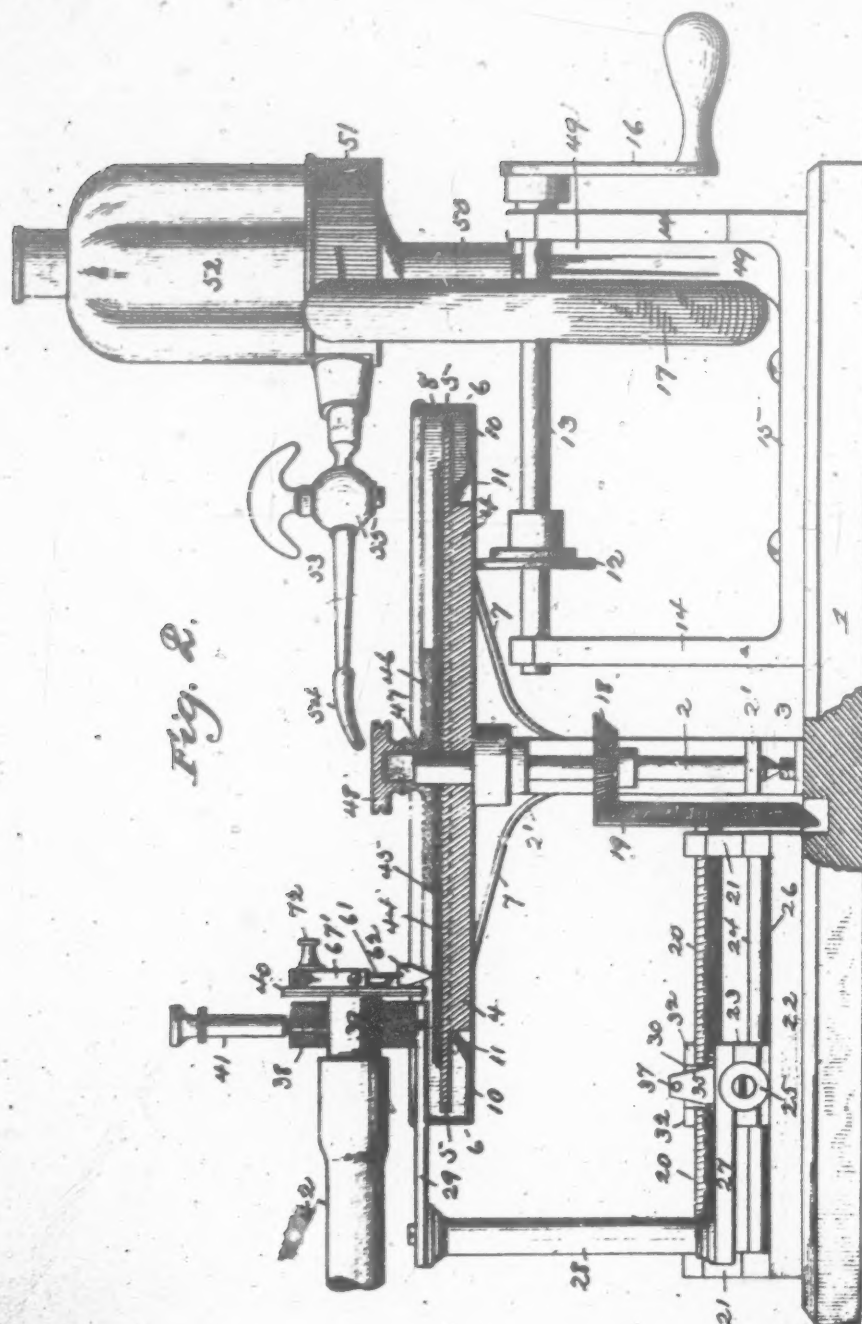


Fig. 2.

Witnesses:  
J. M. Giv.  
G. J. Chapman

Inventor,  
Emile Berliner  
By Joseph Young  
Attorney

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(No Model.)

4 Sheets—Sheet 4.

E. BERLINER.  
GRAMOPHONE.

No. 534,543.

Patented Feb. 19, 1895.

Fig. 4.

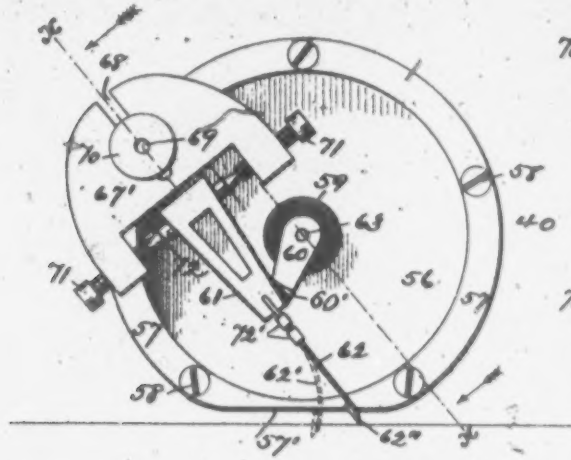


Fig. 5.

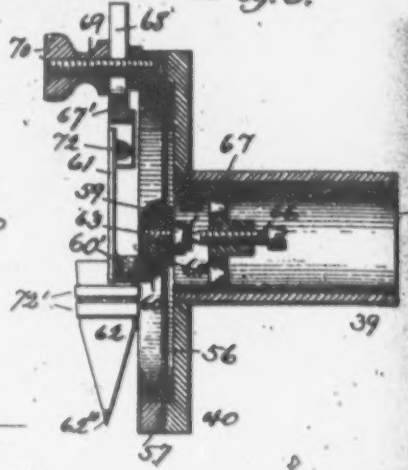


Fig. 6.

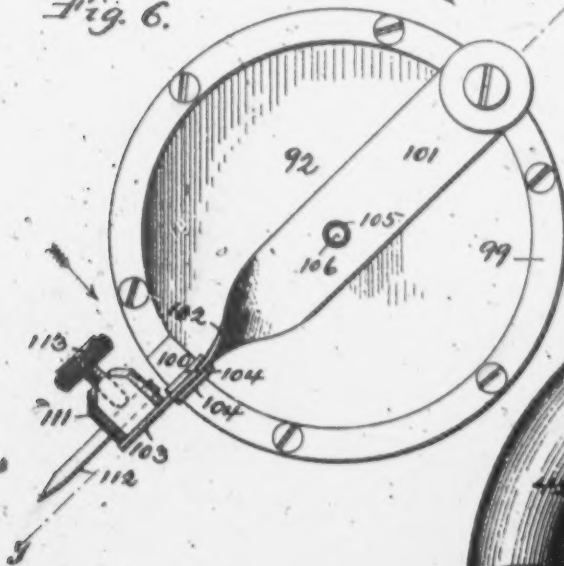


Fig. 7.

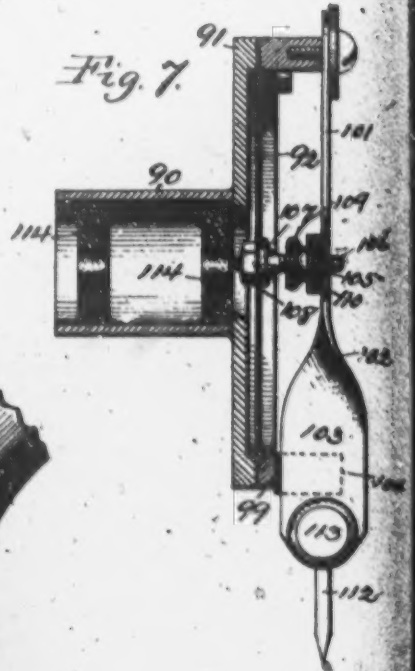
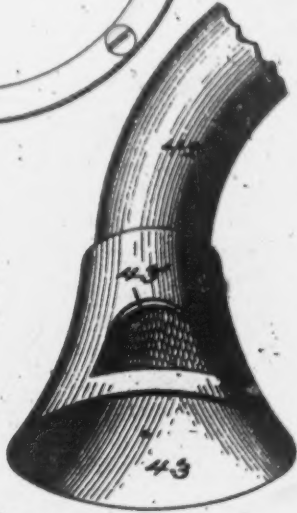


Fig. 8.



Witnesses:

Roy C. Brown  
G. T. Chapman

Inventor:

Emile Berliner

By Joseph G. Goss  
Attorney

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# UNITED STATES PATENT OFFICE.

EMILE BERLINER, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR  
TO THE UNITED STATES GRAMOPHONE COMPANY, OF SAME PLACE.

## GRAMOPHONE.

SPECIFICATION forming part of Letters Patent No. 534,543, dated February 19, 1895.

Application filed March 30, 1892. Serial No. 427,060. (No model.)

### *To all whom it may concern:*

Be it known that I, EMILE BERLINER, a citizen of the United States, and a resident of Washington, District of Columbia, have invented certain new and useful Improvements in Gramophones, of which the following is a specification.

My invention has reference to improvements in the method of and apparatus for recording and reproducing sounds, the improvements being more particularly directed to the construction of that kind of sound recording and reproducing apparatus which I have called "gramophone," and for which Letters Patent of the United States No. 382,790, dated May 15, 1888, have been granted to me.

One feature of my invention has reference to improvements in the method of recording sound by tracing upon a fatty film deposited upon a metallic surface, undulatory lines, corresponding to sound waves, and then etching such lines in the metal base, or as it is now commonly called, the record tablet; while the other features of my invention have reference to the construction of the details of both the recorder and the reproducer of the gramophone. Each of these features of improvement are designed to overcome certain difficulties, and to avoid certain imperfections heretofore met with in the operation of the gramophone. These difficulties and imperfections, and the manner in which they are avoided, will be particularly pointed out in the following detailed description with reference to the accompanying drawings, in which—

Figure 1, is a perspective view of my improved gramophone recorder. Fig. 2 is a side elevation, partly in section, of the recorder. Fig. 3 is a perspective view of a gramophone reproducer. Fig. 4, is an elevation of a recording diaphragm and stylus. Fig. 5, is a section of the same on the line  $x-x$  of Fig. 4. Fig. 6, is an elevation of the gramophone reproducing diaphragm and stylus. Fig. 7, is a section of the same on line  $y-y$  of Fig. 6, and Fig. 8, is a perspective view of an improved mouth-piece for the recorder.

Like numerals of reference indicate like parts throughout the drawings.

My improved gramophone recorder is shown

as a whole in Figs. 1 and 2, mounted upon a suitable base 1. About midway of the length of this base there is an upright shaft 2, journaled in brackets 2', 2', stepped at its lower end in a suitable bearing 3. This shaft carries at its upper end a circular disk 4, the outer or peripheral portion of which is reduced in thickness as shown at 5, and this reduced portion extends over a ring shaped pan 6, supported by stays or brackets 7, from which it may be lifted and removed, when required. The outer edge or wall 8, of the pan is of sufficient height to project for a distance above the disk 4, and is provided with pouring lips 9, for a purpose hereinafter described. The bottom 10 of the pan extends under the reduced portion 5, of the disk 4, and its inner edge 11, is upturned close to the under side of the reduced portion of the disk, as shown.

Bearing against the under side of the disk 4, is a friction wheel 12, secured to a horizontal shaft 13, which latter is journaled in the upper ends of posts or uprights 14 constituting the ends of a frame, the base 15, of which is secured to the base 1 of the apparatus. The position of shaft 13, and the diameter of the friction wheel 12, are such, that a portion of the weight of the disk 4, and of its shaft 2, is supported by the friction wheel; where the bearing 3, is relieved from a portion of that weight, and whereby frictional gearing between the disk 4 and wheel 12 is insured, without requiring special adjustment. The shaft 13, carries at its outer end a crank 16, by means of which it is rotated, and between the two uprights 14, there is secured to the shaft a heavy fly or balance wheel 17. Secured to the upright shaft 2, below the disk 4, there is a beveled pinion 18, meshing with a large bevel gear 19, on one end of a horizontal screw-threaded shaft 20, which is arranged radial to the disk 4, and journaled adjacent to the said gear 19, and also at the other end, in pillow-blocks 21, supported on the end piece of a rectangular frame 22, which in turn is fast on the base 1. Mounted upon the frame 22, so as to be movable thereon in the direction of the length of the shaft 20, there is a carriage 23, supported at one end by a guide rod 24, on which it is free to slide, and at the other end by a roller 25, movable



along the upper surface 26, of one of the side pieces of the frame 22. The carriage 23, has firmly secured to it a projecting arm 27, on the outer end of which is an upright post 28, carrying at its upper end an arm 29, parallel with the arm 27, and of such length as to overhang the disk 4, when the carriage is moved to the right, as represented in the drawings; the construction being such, that when the carriage 23 is moved in the manner to be described, the arm 29, will be carried radially over the disk 4, and any object carried thereby will participate in said movement.

The carriage 23, is moved in one direction by means of the screw-threaded shaft 20, and in order to effect this operation, there is provided a block 30, in one side of which, near one end, is formed a half nut 31, constructed to engage the threads on the shaft 20; and this block 30, is pivotally supported between ears 32, erected on the carriage 23. Projecting from the other end of the block 30, there is a pin 33, to which one end of a spring 34, is attached, the other end of said spring being secured to the carriage 23, and the tendency of the spring is to maintain the block 30, in a tilted position with the nut portion raised out of engagement with the shaft 20. In order to lock the block 30, in engagement with the shaft 20 there is provided a leaf spring 35, mounted on the carriage 20, opposite the free end of the block 30, and having on its free end a tooth 36, which passes over the top of the hinged block 30, when the nut formed in the same is in engagement with the screw threads on the shaft 20, the tendency of the leaf spring 35, being to move inwardly toward the block 30. This catch spring 35, is also provided with a pin 37, which serves as a handle for withdrawing the catch so as to unlock the block 30, and thereby allow the carriage 23 with its appurtenances to be freely moved to any position upon the frame 22.

To the free overhanging arm 29, is secured a ring-sleeve 38 which receives the neck 39, projecting on one side from the frame 40, in which latter the recording diaphragm and stylus are mounted, and this neck 39, with its appurtenances is fixed in any desired position in the ring frame 38, by a clamp screw 41. The free end of the neck 39, projects beyond the ring frame 38, and receives the sound conveying tube 42, which is preferably made flexible, and which has at its free end a mouth-piece 43, the particular construction of which will hereinafter be more fully described.

The disk 4, which is in the nature of a rotary table, has heretofore been described and is shown in the drawings as reduced in thickness on that portion of the periphery which overhangs the inner wall of the pan 6, and if this construction is used, the disk 4, must be removable from the shaft 2. It is, however, also practicable to make the disk or revolving table, in two parts, the lower part of which extending only to within a short dis-

tance of the upper edge of the inner wall 11, of the pan, while the upper part extends over that edge to within a short distance of the outer wall of the pan. This is indicated by a dotted line in Fig. 2, and if this construction is adopted, only the upper thinner part of the table is removable from the upright shaft 2, while the lower thicker part of the table may be fixed to that shaft.

When a sound record is to be made, a record tablet of the kind described in my aforesaid Letters Patent, is placed upon the rotary table 4, and this record tablet is represented in the drawings as a circular disk 44, which has a central perforation passing over the upper end of the shaft 2. Sometimes it is convenient to interpose between the record tablet and the rotary supporting table a thin disk 45, of felt, or of some other non-resonant material. This, however, is not essential. Upon the record tablet is placed a clamping plate 46, which by preference is provided with a hub 47, which is slipped over the upper end of the shaft 2. This upper end of the shaft 2, is screw-threaded as shown, and a thumb-nut 48, is then screwed down upon the hub of the clamping plate, whereby the record tablet is securely fastened in position.

At one end of the base plate 1, there is mounted a standard 49, which may be a split tube as shown, and in which is supported by friction a stem 50, projecting from the bottom of a shelf 51, and which in turn supports a vessel 52, containing alcohol. From the bottom of this vessel extends a tube 53, preferably provided at its free end with a flexible nozzle 54; and a stop-cock 55, with which the tube is provided permits the operator to regulate the flow of alcohol from the nozzle. With my present improvement it is necessary that during the whole process of tracing the record, the record tablet be covered with a film of alcohol, and for this purpose a thin stream of alcohol is directed upon the center of the tablet, or rather upon the clamping plate 46, from which the alcohol spreads in all directions by centrifugal force, and flows over into the pan 6. When the tracing of the record has been completed, the clamping plate is removed and the record tablet also is lifted from its support by the insertion between the same of a sharp edge, such as a knife blade, or even by the finger nails of the operator, and is removed for further manipulation as described in my aforesaid Letters Patent, and also for the manipulation which will be described hereinafter.

Only a very small quantity of alcohol is used for producing a single record, but after continued use of the machine a considerable amount of alcohol accumulates in the pan, and this is removed by removing the table 4, or the upper, thinner part thereof, as the case may be, by inserting a finger in each of the pouring lips 8, and thus lifting the disk or table 4, from the shaft 2. The pan is then removed from the bracket 7, and the alcohol

is poured out and preferably back into the vessel 52, by one of the pouring lips.

The recording diaphragm 56, is mounted in the circular frame 40, between a ledge formed on said frame and an annulus 57, screwed down upon the same by screws 58, as shown, or in any other suitable manner. On the rear side of that diaphragm there is applied a small block 59, of hard rubber from which extends radially an arm 60, which at its free end is turned up at right angles, outwardly and into contact with the lever 61, which carries the recording stylus 62.

The block 59, is fastened to the center of the diaphragm by a screw 63, passing through the diaphragm and through a washer 64, applied to the front side of the diaphragm. The head of this screw is faced with a disk 65, of soft rubber, and against the same bears the point of an adjusting screw 66, which is mounted in a perforated disk or spider 67, fixed in the neck 39.

The lever 61 is mounted on a plate 67', formed with a slot 68, through which a set screw 69, fixed in the annulus 57, passes. The plate 67', can thus be adjusted to various positions on the annulus, and is clamped in the adjusted position by a thumb-nut 70. One end of the plate 67' is bifurcated, and screws 71, 71, passing through the legs of the fork, are formed at their ends with bearings for the pivot points of the arbor 72, which is fixed to the lever 61. This lever, is made as light as practicable and as is consistent with rigidity, and the plate 67', together with the lever 61, which it carries, is so adjusted that the upturned end of the arm 60, bears upon the lever at the greatest practicable distance from the axis of the spindle 72, viz: at the free end of the lever. The connection between the lever and the upturned end of the arm 60 is made by a small quantity of pitch, 60', which acts as an efficient cement, and which is applied after the lever has been adjusted to its proper position. This mode of connecting the lever with the arm 60, and thereby with the diaphragm, I have found to be of great advantage for a variety of reasons, but more especially on account of the ease with which the connection is made, and unmade in case of repair, and on account of the damping effect it has upon the lever.

To the end of the lever 61, is secured the recording stylus 62, by soldering or otherwise, with its plane at right angles to the plane of the lever, as shown. The stylus is composed of a flat, and rather thin plate of spring steel, pointed at its free end, and provided with a tracing point 62'', of iridium. The broad portion of the stylus is damped by one or two bands 73', of soft rubber, which are simply slipped over the same.

By reference to Fig. 4, it will be seen that the lever 61, with the recording stylus 62 extends across the diaphragm upon a line which constitutes a chord but not a diameter of the circle of the diaphragm. They are, therefore,

eccentrically mounted with reference to the center of the diaphragm; but notwithstanding this eccentric location, the lever is rigidly connected with the center of the diaphragm and thus receives the maximum amplitude of its vibration. By thus placing the lever with the stylus eccentric with reference to the center of the diaphragm both the lever and the stylus may be and are made shorter than if they were located on the line of a diameter of the diaphragm. This is an important result, since the shorter the lever and stylus, the less liability there is of lost motion, and the less liability there is of extra or spontaneous vibrations of the lever and stylus, and both of these facts conspire to produce an accurate tracing of the sound waves impinging against the diaphragm.

Where the stylus passes over the edge of casing 40, the latter, together with the annulus 57, is cut away upon a straight line, as indicated at 57'. This permits a further reduction of the length of the stylus, since the record tablet may be located close to the straight edge 57'.

The body of the stylus is normally curved downwardly, as shown in dotted lines at 62', but when the diaphragm holder or frame 40, is turned to cause the stylus to impinge upon the record tablet, which is the preparatory step for making a record, the stylus is unbent and becomes straight, as shown in solid lines in Fig. 4, and I have found that the best results are obtained when the stylus is at an angle of about forty-five degrees with the plane of the tablet. The maximum pressure of the stylus upon the record surface is therefore equal to the force required to unbend the stylus. It is very small, because the stylus is made as thin as practicable, and it is uniform for different records and for all parts of the same record.

The mouth-piece, into which vocal sounds are uttered for recording, is shown at 43, in Figs. 1 and 8, and it consists of a bell shaped structure, the small end of which is secured to the sound conveying tube, while the wide, flaring end is turned toward the speaker who applies his mouth to the opening. Near the edge of the mouth opening there is a perforation 43', cut into the wall of the mouth-piece, and this perforation is of such shape and size, and at such distance from the edge of the mouth-piece, as to fit approximately the edge of the nose of the speaker; so that when the mouth-piece is applied, the sounds uttered by the mouth enter the wide, flaring opening, while the sounds uttered by the nose enter the perforation 43'.

In making a record of vocal sounds, it is necessary that all sound waves composing the words or the song be conveyed to the diaphragm, and it has, therefore, been proposed to make mouth-pieces of such size and shape as to admit within the opening both the mouth and the nose of the speaker or singer, and to fit against the face of the user around the



mouth and nose. Mouth pieces of this character are necessarily large and clumsy, and do not readily and comfortably fit different persons, while with my construction the size of the mouth-piece is reduced, and will comfortably fit different speakers.

By means of the apparatus so far described, a record of sound waves is made in the following manner: The spring catch 35, 36, is drawn back, which permits the spring 34, to lift the block 30, from the screw 20, so that the carriage 23, may be freely moved to the left, whereby the stylus 62, is carried beyond the edge of the rotary table 4. A record tablet prepared in the manner described in my aforesaid Letters Patent is then placed upon the table 4, and clamped to the same, as hereinbefore described, and the carriage 23, is moved toward the right until the point of the recording stylus is above the tablet but within the edge of the same. The casing 40, is then turned in its bearing 38, until the point of the stylus impinges upon the tablet and is unbent, as shown in Fig. 4. In this position the casing 40, is clamped by means of the screw 41. The stop-cock 55, is then opened and a thin stream of alcohol is directed upon the clamping disk 46. The wheel 17, is now rotated by means of the crank and handle 16, whereby, by means of the gearing described, the record tablet is rotated, while the stylus is carried across the face of the tablet in a radial line, removing from the tablet a fine spiral line of the fatty etching ground with which it had been covered. Sound waves are now directed against the diaphragm in any desired manner, and if vocal sounds are to be recorded, the sound conveying tube 42, with the mouth piece 43, will be used. The vibrations of the diaphragm thus produced will cause the stylus to make a tracing of an undulatory line, corresponding to the sound waves directed against the diaphragm; all as described in my aforesaid Letters Patent. During this whole time a thin stream of alcohol is delivered upon the plate 46, and the alcohol spreading out in all directions is maintained as a uniform and constantly renewed film upon the tablet. In this manner every part of the record is made under alcohol, and in this respect my present invention differs from the process set forth in my aforesaid Letters Patent.

In accordance with the said patent, alcohol is poured once for all over the tablet, and is allowed to evaporate during the process of recording. I have found that in this manner it often happens that the alcohol has entirely evaporated before the record is completed, so that a portion of the latter is made upon a dry tablet; whereby the accumulation of elementary particles of dust on the point of the stylus, which the alcohol is designed to avoid, takes place during the production of a portion of the record. With my present improvement this defect is cured, since it maintains the record tablet moist with alcohol from the beginning to the end of the operation.

After the tracing of the record has been completed, the tablet is speedily removed and before the record is fixed by etching as described in my aforesaid patent, the alcohol adhering to the record surface is quickly washed off with water. This is an important step in my improved process and greatly improves the definition of the record by etching. The reason for this is, that the alcohol slightly attacks and dissolves the fatty etching ground, so that the thin film of alcohol remaining upon the tablet, contains a slight quantity of that ground in solution. If now, the film of alcohol is allowed to evaporate an exceedingly small quantity of the dissolved ground is deposited upon the metal which has been laid bare by the stylus. This small deposit of ground sufficiently resists the action of the etching fluid to impair the definition of the final record. By simply pouring water over the record surface immediately after the tablet has been removed from the recording apparatus the film of alcohol and the ground held in solution by the same is removed, and the tracings of the stylus present a clean metallic surface, which is properly attacked by the etching fluid.

The reproducing apparatus as a whole is represented in Fig. 3.

Upon a base board 73, in standards 74, is journaled a shaft 75, upon which are mounted a driven pulley 76, a fly-wheel 77, and a friction disk 78. The latter is in frictional engagement with a rotary table 79, which is mounted upon a vertical shaft substantially in the manner described with reference to the rotary table 4, of the recording apparatus. Fig. 3, being a perspective view, the mounting of the table 79, is not visible, but is easily understood from the foregoing description. The upper surface of the table is preferably covered with a sheet of felt or other elastic and non-resonant material, as indicated by appropriate shading.

Upon the felt covered table 79, the record tablet 44, is placed and is clamped thereon substantially in the manner in which this is done in the transmitting apparatus, i. e., by means of a clamping plate 46, and a thumb-nut 48. A driving wheel 80, mounted on a shaft 81, which is journaled in standards 82, is rotated by means of a crank 83, and handle 84, and gives motion to the table 79, by means of a crossed belt or cord 85. The relation of the table 79, to the friction disk 78, is the same as the relation of the table 4, to the friction disk 12; that is to say, the table rests with the greater part of its weight upon the friction disk, so that the frictional gearing is automatically maintained. A post 86, mounted upon the base-board 73, has swiveled upon its upper end a fork 87, between the prongs of which is pivoted the swinging arm 88, which extends over the table 79, and has at its free end a clasp 89, which receives the neck 90, which projects from the center on one side of the casing 91, of the reproducing

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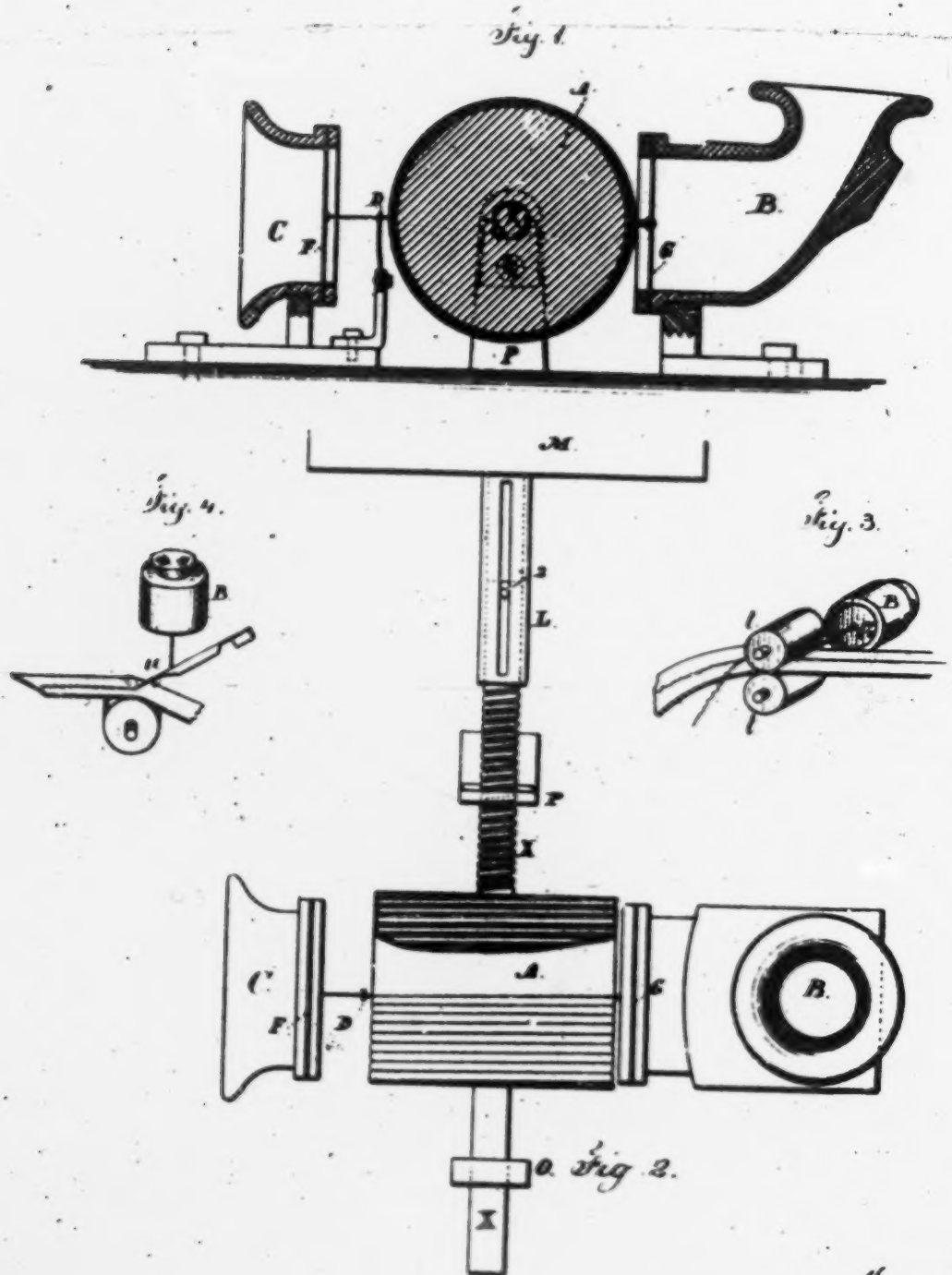
**PAGE**



T A: EDISON.  
Phonograph or Speaking Machine..

No. 200,521.

Patented Feb. 19, 1878.



Witnesses

Chas. L. Smith  
Harold Berrell

Inventor

Thomas A. Edison.

per Lemuel W. Berrell

its diaphragm, stylus and appurtenances, which will presently be described, can be thus turned in the clasp, and can be fixed in any adjusted position by a clamp screw 93.

Upon the end of the neck 90, which projects beyond the clasp 89, is slipped a flexible tube 94, which in turn receives the small end of a sound conveying trumpet 95, the flaring end 96 of which is turned toward the listener. A bracket 97, secured to the swinging arm 88, carries at its free end an elastic fork 98, which receives and supports the trumpet, and the parts are so proportioned that the free end of the swinging arm preponderates, so that the point of the reproducing stylus, which will presently be described, presses rather firmly upon the record tablet.

It will now be understood, that when a record tablet, having a record of sound waves upon its surface, produced in accordance with my invention, is mounted upon the table 79, and when the point of the stylus is adjusted in engagement with the record groove, and the wheel 80, is rotated, the rotating record groove will guide the stylus across the face of the tablet, and will at the same time vibrate the stylus and diaphragm in accordance with the undulations of the record groove. The sound waves thus produced by the diaphragm will issue from the flaring opening of the trumpet, and the sounds will be heard by a listener in front of the trumpet, or in its vicinity.

The reproducing diaphragm is mounted in the casing 91, in the usual manner, being held against a ledge by means of an annulus 99. On this annulus is formed a swelling or block 100, and diametrically opposite to the same the stylus carrying spring 101, is fastened to the annulus, and extends across the face of the diaphragm and beyond the edge of the annulus. This spring 101, is a leaf spring which faces with its flat side the face of the diaphragm up to a point beyond the center of the latter, and is then twisted at right angles, as indicated at 102, and crosses the annulus edgewise as shown at 103. The tendency of the part 101, of the spring is to press toward the diaphragm, whereby the edge of the part 103, is made to bear with some force upon the annulus 99; and the tendency of the part 103, is to press against the swelling or block 100. The spring is therefore elastic in two directions at right angles to each other.

In order to prevent grinding of the spring against the annulus and against the block 100, a U-shaped piece 104, of soft rubber embraces the outer portion 103, where it bears upon the annulus and against the block. This soft rubber cushion also serves as a dampener for the spring. At the point where the spring passes over the center of the diaphragm, it has a perforation 105, and a screw pin 106, secured to the center of the diaphragm by two nuts 107, 108, extends loosely through the perforation. A thumb-nut 109, also placed on the screw-pin 108, and a soft rubber washer

110 between the thumb-nut and the spring serve to regulate the tension of the latter and of the diaphragm, as will be readily understood.

On the free end of the spring 101, 103, there is secured a binding post 111, in which the stylus 112, is held by the set screw 113, and may be adjusted to project to the required distance beyond the end of the spring. This stylus is preferably made of hard steel. It has a slender point, but the point should not be so sharp as to cut the bottom of the record groove which it engages.

In the operation of reproducing the sounds recorded on a tablet, the stylus is guided by the walls of the record groove, and not by the bottom of the same. Consequently it is not essential that the point of the stylus be in contact with the bottom of the groove. In fact it is preferably not in contact with the same, so that this point may be made rather dull.

The sounds emitted by the reproducing diaphragm are very powerful and ordinarily too loud to be received with comfort by a listener in front of the trumpet or other receiving tube. For this reason I have found it sometimes necessary to reduce the volume of the emitted sound before it reaches the ear, and this I accomplish by one or more perforated and exchangeable diaphragms 114, placed in the neck 90. These diaphragms should be made of some non-resonant material like soft rubber, or cork, as indicated by appropriate shading.

Having now fully described my invention, I claim and desire to secure by Letters Patent—

1. The method of recording vocal and other sounds which consists in removing from a record tablet covered with a fatty film, undulatory lines of said film by, and in accordance with the sound waves and maintaining at the same time a layer of a fluid over the film, substantially as described.

2. The method of recording vocal and other sounds upon a rotating disk covered with a fatty film which consists in spreading over said film and continuously renewing over the same a layer of a fluid and at the same time removing from said tablet undulatory lines of the fatty film by and in accordance with the sound waves, substantially as described.

3. The improvement in the art of making a gramophone record which consists in immersing and maintaining the tablet and the point of the recording stylus in alcohol during the process of recording, substantially as described.

4. The improvement in the art of making and fixing a gramophone record which consists in removing from a tablet covered with a fatty film undulatory lines of said film by and in accordance with sound waves while said film is covered with a layer of alcohol; then immediately removing the alcohol with water and then subjecting the tablet to the



action of an etching fluid, substantially as described.

5. The method of reproducing sounds from a record of the same which consists in vibrating a stylus and propelling the same along the record by and in accordance with the said record, substantially as described.

6. In a gramophone, a recording stylus pressing by its own elasticity upon the record tablet at right angles to the plane of its vibratory movements and consisting of a leaf spring terminating in a point of harder material than that of the body of the stylus, substantially as described.

7. In a gramophone, the combination of a sound receiving diaphragm and an elastic recording stylus controlled by the diaphragm and adjustable with reference to a record tablet so as to press by its own elasticity upon the same at right angles to the plane of its vibratory movements, substantially as described.

8. In a gramophone a recording stylus pressing by its own elasticity upon the record tablet at right angles to its plane of vibratory movements, and consisting of a leaf spring terminating in an iridium point, substantially as described.

9. In a gramophone, a recording stylus composed of a leaf spring terminating in a tracing point in combination with one or more elastic non-sonorous dampers, substantially as described.

10. In a gramophone a recording stylus formed of a leaf spring terminating in a tracing point in combination with one or more sleeves of soft rubber upon the leaf spring for damping the same, substantially as described.

11. In a gramophone, the combination of a sound receiving diaphragm, a lever and a recording stylus carried by the same, both extending parallel but eccentrically over the diaphragm; with a connection between the center of the diaphragm and the lever, substantially as described.

12. In a gramophone, the combination of a sound receiving diaphragm a lever and a recording stylus carried by the same, both extending over the face of the diaphragm but eccentrically thereto, with a rigid connection between the center of the diaphragm and the free end of the lever, substantially as described.

13. In a gramophone, the combination of a circular sound receiving diaphragm, a lever and an elastic recording stylus both extending parallel with the diaphragm on the line of a chord, with a rigid connection between the center of the diaphragm and the free end of the lever, substantially as described.

14. In a gramophone, the combination of a sound receiving diaphragm, a lever and an elastic stylus carried by the same, both extending parallel, but eccentrically thereto; with a bracket rigidly connected with the center of the diaphragm and removably connected to the lever, substantially as described.

15. In a gramophone, the combination of a sound receiving diaphragm mounted in a suitable frame, a bracket adjustably mounted on said frame, a lever pivoted in said frame extending parallel to and eccentrically with reference to the center of the diaphragm, and an elastic recording stylus carried by the lever; with a mechanical connection between the center of the diaphragm and the free end of the lever, substantially as described.

16. In a gramophone a sound receiving diaphragm and a tube for conveying sound waves thereto in combination with a recording stylus receiving motion from the diaphragm, and a screw mounted in the sound conveying tube bearing centrally upon the diaphragm for adjusting the tension of the latter, substantially as described.

17. In a gramophone, the combination of a horizontal rotary table adapted to support a record tablet, and a vertical shaft free to move longitudinally, carrying the tablet, with a friction disk engaged by the under side of the table for rotating the latter, substantially as described.

18. In a gramophone the combination of a horizontal rotary table mounted upon a vertical shaft and adapted to support a record tablet; with a friction disk engaging the under side of the table and partly sustaining the weight of the table, whereby the latter is automatically maintained in frictional gear with said disk, substantially as described.

19. In a gramophone, the combination of a rotary horizontal table adapted to receive and support a flat record tablet; with a reservoir of a suitable fluid, such as alcohol, discharging upon the center of the table and tablet, and an annular pan disposed underneath the table for receiving the overflow of alcohol, substantially as described.

20. In a gramophone the combination of a horizontal rotatable table adapted to receive and support a record tablet; with a reservoir of alcohol discharging upon the center of the table and tablet, an annular pan disposed under the edge of the table for receiving the overflow of alcohol, and a friction disk bearing upon the under side of the table between the center of the same and the inner wall of the pan, substantially as described.

21. In a gramophone, the combination of a horizontal rotary table adapted to receive and support a record tablet, a recording diaphragm and stylus connected by gearing with the table to move radially over and with the stylus in operative relation to the same, substantially as described.

22. In a gramophone, the combination of a horizontal rotating table adapted to receive and sustain a flat record tablet, with a carriage movable in a line parallel to a radius of the table, a recording diaphragm and stylus carried by the carriage with the stylus in operative contact with the record tablet, and

gearing connecting the table with said carriage, substantially as described.

23. In a gramophone, a sound conveying tube provided with a mouth piece having a flaring opening for the application of the mouth of the speaker and a perforation in the side wall of the mouth piece separated from and spaced with reference to the mouth opening and shaped to correspond to the shape of the nostrils of the speaker, substantially as described.

24. In a gramophone a sound reproducing diaphragm in combination with a stylus lever extending diametrically across the same, and elastic in two directions at right angles to each other, substantially as described.

25. In a gramophone, the combination of a diaphragm and a stylus carrier composed of a leaf spring twisted at one point so as to bring the edge of one portion at right angles to the face of the other portion, whereby it is elastic in two directions, substantially as described.

26. In a gramophone the combination of a reproducing diaphragm and stylus; with a stylus carrier composed of a leaf spring extending flat-wise over the face of the diaphragm and edgewise over the edge of the diaphragm, substantially as described.

27. In a gramophone the combination of a reproducing diaphragm mounted in a suitable frame the latter being provided at one point with a boss or stop; with a double elastic stylus carrier composed of a twisted leaf-spring tending toward the diaphragm and against the boss or stop, substantially as described.

28. In a gramophone, a reproducing diaphragm and stylus in combination with an elastic stylus carrier extending over the face of the diaphragm and tending toward the same, of an adjustable connection between the diaphragm and stylus carrier and adjustable for varying the pressure between diaphragm and style carrier, substantially as described.

29. In a gramophone the combination of a reproducing diaphragm mounted in a suitable frame provided with a boss or stop; with a

double elastic stylus carrier tending toward the diaphragm and toward the stop, and elastic non-resonant dampers interposed between the style carrier and the diaphragm and between the style carrier and the frame and stop, substantially as described.

30. In a gramophone a sound reproducing diaphragm and a sound conveying tube for the same, with one or more non-resonant perforated diaphragms in the said tube for reducing the volume of sound conveyed to the ear substantially as described.

31. In a gramophone a recording stylus pivoted to move in response to the vibrations of a diaphragm and elastic in a plane at right angles to such motions, substantially as described.

32. In a gramophone, a reproducing stylus having a wedge-shaped point engaging the walls of the record groove, substantially as described.

33. In a gramophone reproducer, a stylus carried or formed by a spring fixed at one end to the diaphragm holder and freely extending across and beyond the same and operatively connected with the center of the diaphragm, substantially as described.

34. In a gramophone reproducer, a spring constituting or carrying a stylus, fixed at one end to the diaphragm holder and extending across and beyond the periphery of the same and freely pressing against the diaphragm, substantially as described.

35. In a sound reproducing apparatus consisting of a traveling tablet having a sound record formed thereon and a reproducing stylus shaped for engagement with said record and free to be vibrated and propelled by the same, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EMILE BERLINER.

Witnesses:

HENRY E. COOPER,  
F. T. CHAPMAN.



# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY.

## IMPROVEMENT IN PHONOGRAPH OR SPEAKING MACHINES.

Specification forming part of Letters Patent No. 200,521, dated February 19, 1878; application filed December 24, 1877.

*all whom it may concern:*

Be it known that I, THOMAS A. EDISON, of Menlo Park, in the county of Middlesex and State of New Jersey, have invented an Improvement in Phonograph or Speaking Machines, of which the following is a specification:

The object of this invention is to record in permanent characters the human voice and other sounds, from which characters such sounds may be reproduced and rendered audible again at a future time.

The invention consists in arranging a plate, diaphragm, or other flexible body capable of being vibrated by the human voice or other sounds, in conjunction with a material capable of registering the movements of such vibrating body by embossing or indenting or altering such material, in such a manner that such register-marks will be sufficient to cause a second vibrating plate or body to be set in motion by them, and thus reproduce the motions of the first vibrating body.

The invention further consists in the various combinations of mechanism to carry out my invention.

I have discovered, after a long series of experiments, that a diaphragm or other body capable of being set in motion by the human voice does not give, except in rare instances, superimposed vibrations, as has heretofore been supposed, but that each vibration is separate and distinct, and therefore it becomes possible to record and reproduce the sounds of the human voice.

In the drawings, Figure 1 is a vertical section, illustrating my invention, and Fig. 2 is plan of the same.

A is a cylinder having a helical indenting-groove cut from end to end—say, ten grooves to the inch. Upon this is placed the material to be indented, preferably metallic foil. This drum or cylinder is secured to a shaft, X, having at one end a thread cut with ten threads to the inch, the bearing P also having a thread cut in it.

L is a tube, provided with a longitudinal slot, and it is rotated by the clock-work at M, or other source of power.

The shaft X passes into the tube L, and it is rotated by a pin, 2, secured to the shaft,

and passing through the slot on the tube L, the object of the long slot being to allow the shaft X to pass endwise through the center or support P by the action of the screw on X. At the same time that the cylinder is rotated it passes toward the support O.

B is the speaking-tube or mouth-piece, which may be of any desired character, so long as proper slots or holes are provided to re-enforce the hissing consonants. Devices to effect this object are shown in my application, No. 143, filed August 28, 1877. Hence they are not shown or further described herein.

Upon the end of the tube or mouth-piece is a diaphragm, having an indenting-point of hard material secured to its center, and so arranged in relation to the cylinder A that the point will be exactly opposite the groove in the cylinder at any position the cylinder may occupy in its forward rotary movement.

The speaking-tube is arranged upon a standard, which, in practice, I provide with devices for causing the tube to approach and recede from the cylinder.

The operation of recording is as follows: The cylinder is, by the action of the screw in X, placed adjacent to the pillar P, which brings the indenting-point of the diaphragm G opposite the first groove on the cylinder, over which is placed a sheet of thick metallic foil, paper, or other yielding material. The tube B is then adjusted toward the cylinder until the indenting-point touches the material and indents it slightly. The clock-work is then set running, and words spoken in the tube B will cause the diaphragm to take up every vibration, and these movements will be recorded with surprising accuracy by indentations in the foil.

After the foil on the cylinder has received the required indentations, or passed to its full limit toward O, it is made to return to P by proper means, and the indented material is brought to a position for reproducing and rendering audible the sounds that had been made by the person speaking into the tube B.

O is a tube similar to B, except that the diaphragm is somewhat lighter and more sensitive, although this is not actually necessary. In front of this diaphragm is a light spring, D, having a small point shorter and finer than

the indenting-point on the diaphragm of B. This spring and point are so arranged as to fall exactly into the path of all the indentations. This spring is connected to the diaphragm F of C by a thread or other substance capable of conveying the movements of D. Now, when the cylinder is allowed to rotate, the spring D is set in motion by each indentation corresponding to its depth and length. This motion is conveyed to the diaphragm either by vibrations through a thread or directly by connecting the spring to the diaphragm F, and these motions being due to the indentations, which are an exact record of every movement of the first diaphragm, the voice of the speaker is reproduced exactly and clearly, and with sufficient volume to be heard at some distance.

The indented material may be detached from the machine and preserved for any length of time, and by replacing the foil in a proper manner the original speaker's voice can be reproduced, and the same may be repeated frequently, as the foil is not changed in shape if the apparatus is properly adjusted.

The record, if it be upon tin-foil, may be stereotyped by means of the plaster-of-paris process, and from the stereotype multiple copies may be made expeditiously and cheaply by casting or by pressing tin-foil or other material upon it. This is valuable when musical compositions are required for numerous machines.

It is obvious that many forms of mechanism may be used to give motion to the material to be indented. For instance, a revolving plate may have a volute spiral cut both on its upper and lower surfaces, on the top of which the foil or indenting material is laid and secured in a proper manner. A two-part arm is used with this disk, the portion beneath the disk having a point in the lower groove, and the portion above the disk carrying the speaking and receiving diaphragmic devices, which arm is caused, by the volute spiral groove upon the lower surface, to swing gradually from near the center to the outer circumference of the plate as it is revolved, or vice versa.

An apparatus of this general character adapted to a magnet that indents the paper is shown in my application for a patent, No. 128, filed March 26, 1877; hence no claim is made herein to such apparatus, and further description of the same is unnecessary.

A wide continuous roll of material may be used, the diaphragmic devices being reciprocated by proper mechanical devices backward and forward over the roll as it passes forward; or a narrow strip like that in a Morse register may be moved in contact with the indenting-point, and from this the sounds may be reproduced. The material employed for this purpose may be soft paper saturated or coated with paraffine or similar material, with a sheet of metal foil on the surface thereof to receive the impression from the indenting-point.

I do not wish to confine myself to reproduc-

ing sound by indentations only, as the transmitting or recording device may be in a sinusoidal form, resulting from the use of a thread passing with paper beneath the pressure-rollers *t*, (see Fig. 3,) such thread being moved laterally by a fork or eye adjacent to the roller *t*, and receiving its motion from the diaphragm G, with which such fork or eye is connected, and thus record the movement of the diaphragm by the impression of the thread in the paper to the right and left of a straight line, from which indentation the receiving diaphragm may receive its motion and the sound be reproduced, substantially in the manner I have already shown; or the diaphragm may, by its motion, give more or less pressure to an inking-pen, *u*, Fig. 4, the point of which rests upon paper or other material moved along regularly beneath the point of the pen, thus causing more or less ink to be deposited upon the material, according to the greater or lesser movement of the diaphragm. These ink-marks serve to give motion to a second diaphragm when the paper containing such marks is drawn along beneath the end of a lever resting upon them and connected to such diaphragm, the lever and diaphragm being moved by the friction between the point being greatest, or the thickness of the ink being greater where there is a large quantity of ink than where there is a small quantity. Thus the original sound-vibrations are reproduced upon the second diaphragm.

I claim as my invention—

1. The method herein specified of reproducing the human voice or other sounds by causing the sound-vibrations to be recorded, substantially as specified, and obtaining motion from that record, substantially as set forth, for the reproduction of the sound-vibrations.

2. The combination, with a diaphragm exposed to sound-vibrations, of a moving surface of yielding material—such as metallic foil—upon which marks are made corresponding to the sound-vibrations, and of a character adapted to use in the reproduction of the sound, substantially as set forth.

3. The combination, with a surface having marks thereon corresponding to sound-vibrations, of a point receiving motion from such marks, and a diaphragm connected to said point, and responding to the motion of the point, substantially as set forth.

4. In an instrument for making a record of sound-vibrations, the combination, with the diaphragm and point, of a cylinder having a helical groove and means for revolving the cylinder and communicating an end movement corresponding to the inclination of the helical groove, substantially as set forth.

Signed by me this 15th day of December  
A. D. 1877.

THOS. A. EDISON.

Witnesses:

GEO. T. PINCKNEY,  
CHAS. H. SMITH.



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T. A. EDISON.  
Phonograph.

No. 227,679.

Patented May 18, 1880.

Fig. 1.

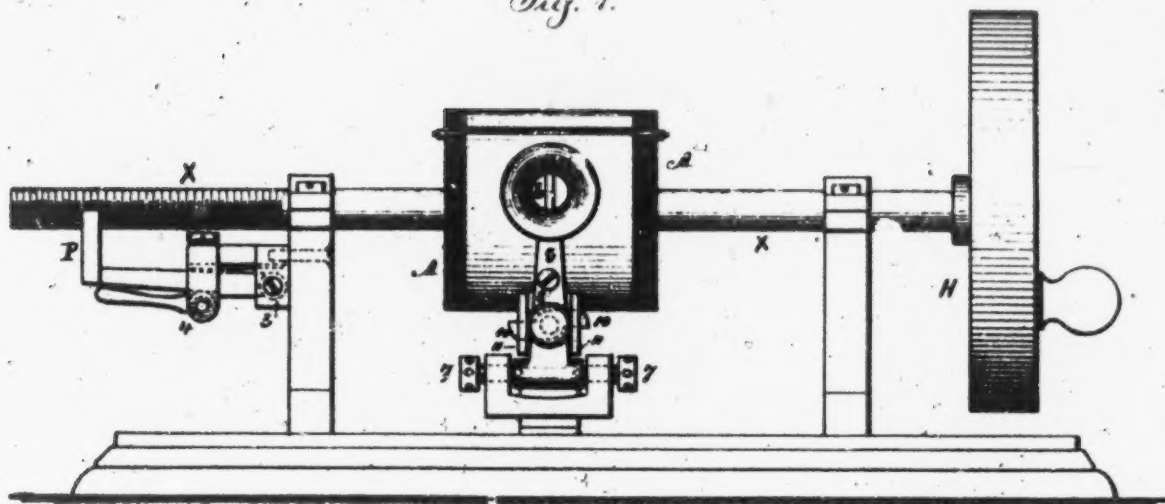


Fig. 2.

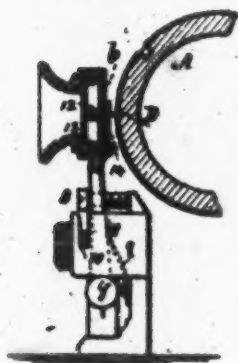


Fig. 3.

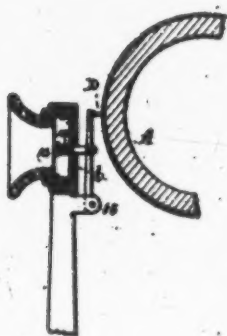
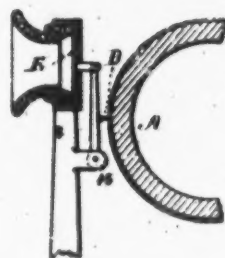


Fig. 4.



Witnesses.

Harold Snell  
Chas. H. Smith

Inventor

Thomas A. Edison  
Emmet W. Merrill  
att'y



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**PAGE**

T. A. EDISON.  
Phonograph.

No. 227,679.

Patented May 18, 1880.

Fig. 4.

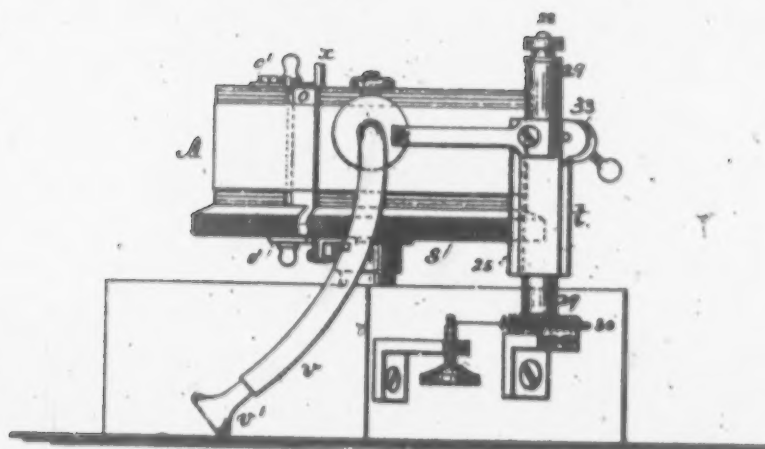


Fig. 3.

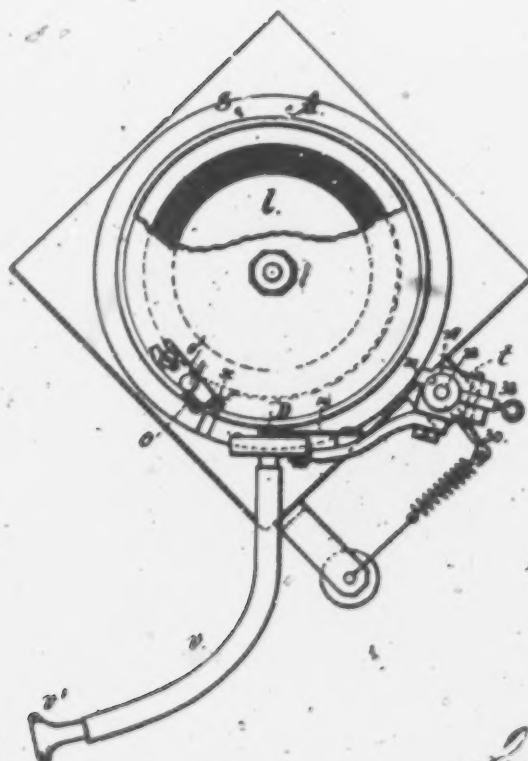
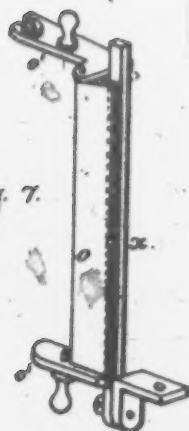


Fig. 7.



Witnesses:  
Hiram S. Smith  
Charles F. Smith

Inventor:  
Thomas A. Edison  
per Lemuel W. Perrell  
[Signature]

# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY.

## PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 227,679, dated May 18, 1880.

Application filed March 29, 1879.

To all whom it may concern:

Be it known that I, THOMAS ALVA EDISON, of Menlo Park, in the State of New Jersey, have invented an Improvement in Phonographs, (Case No. 174,) of which the following is a specification.

In Letters Patent No. 200,521, granted to me, a cylinder with a helical-grooved surface is revolved with its screw-shaft and moved along endwise. Upon this cylinder there is a sheet of foil or similar material, and the same is indented by the action of a point moved by a diaphragm, and this foil forms a phonogram that can be used to reproduce the original sounds when moved in contact with a point and diaphragm. In the said patent one of the points is shown as connected directly to the diaphragm, and the other point is upon a spring.

My present invention relates to improvements upon the phonograph patented as aforesaid, and the features of such improvement are hereinafter specially pointed out.

In the drawings, Figure 1 is an elevation of the phonograph. Fig. 2 is a section of the diaphragm. Fig. 3 is an end view of the cylinder containing the foil. Fig. 4 is a side view of the diaphragm and the device for moving the same.

The cylinder A has a grooved surface, as in aforesaid patent, and it receives the tin-foil or other material that is to be indented by the action of the diaphragm b and point to produce the record of the sound, which I term the "phonogram," and the diaphragm E and point D are adapted to form a phonet and reproduce the sound; but it is to be understood that the same point and diaphragm may be employed to record and to reproduce the sound.

In my present invention, as in my former patent, the motion of the recording-surface may be derived from clock-work, hand, or other power.

In order to insure great uniformity of speed and prevent irregularity in the movement by inaccuracies of work, dust, lack of oil, or any other source of local friction or resistance, I make use of an abnormally heavy fly-wheel,

H, upon the shaft of the phonograph, so as to prevent any trembling movement and to resist any tendency to increase or lessen the speed, for upon uniformity of speed of the phonet with the phonograph depends the accuracy of reproduction, especially in musical sounds, that depend for their tone upon the number of vibrations per second.

The nut P is upon a lever pivoted at 3 and kept in contact by a cam, 4. When this lever and nut P are lowered the shaft X and cylinder A can be slipped endwise.

The arm 5, carrying the diaphragm b, should be pivoted at 7, 7 by pointed screws, so as to adjust the position of the recording-point of the diaphragm b relatively to the grooves of the cylinder. The screw 8 determines the position to which the diaphragm and recording-point may approach to the cylinder. The spring 9 serves to move the arm 5 away from the cylinder, and the double-ended locking-piece 10, entering slots in the frame 11, holds the arm in place when in use.

One of the peculiarities of the present invention over the aforesaid patent is a spring, 12, of india-rubber or other suitable material, placed between the cross-bar or bridge 13 and the diaphragm, that serves as a damper to prevent false vibrations of the diaphragm, and cause it to respond only to the actual movement given by the phonogram through the point D. It is also usually preferable to employ a spring, 14, between the point and the diaphragm. This is useful, in both the phonograph and the phonet, to prevent false sounds. This spring and diaphragm I have used in connection with telephones. I do not, therefore, herein lay claim to the same, broadly. I have combined the same with the recording or phonet point and the phonogram.

Another feature of invention relates to a lever between the diaphragm and the phonogram, whereby the relative movements of the parts may be varied. This lever c has a fulcrum at 15. If the connection to the diaphragm is between the point D and fulcrum 15, as in Fig. 5, then the motion of the point will be greater than the diaphragm, and when used in the phonograph will amplify the indentations



in the foil. If used in the phonet, the movement of the diaphragm would be lessened. I therefore prefer, in that instrument, to change the places of the point and diaphragm connection, as shown in Fig. 6, so as to amplify the movement of the diaphragm and increase the sound.

Another feature of my present invention relates to the foil-holder, which I place on a reel within the cylinder A, and draw the same out through a slot, as required from time to time, thus preserving the foil from injury and rendering it unnecessary to handle the same.

The reel I within the cylinder A is adapted to receive the foil in a roll upon it. One head of the cylinder is removable, so as to allow of the insertion or withdrawal of the reel. There is a slot in the cylinder, through which the foil is brought out, and there is a bar, *o*, forming part of the periphery of the cylinder, that is connected at its ends to the slides *o'*, (see Fig. 7,) one at each end of the cylinder, and there is a lever-bar, *x*, behind this slide-bar *o*. When the slide *o'* is drawn back from over the lever *x*, such lever can be swung out of the slot in the cylinder A, and the foil can be drawn out of the slot and wrapped around the cylinder, and then the end is placed behind the bar *x*, and carried by it into the slot of the cylinder, and then the slide *o'* is moved so that its edge passes over the lever *x*, and in so doing the foil is tightened around the cylinder and the lever *x* held in place. The surface of this cylinder is made with a helical groove, and the rim *s* of the cylinder is made with a similar screw or groove, and the sliding sleeve *t*, that carries the diaphragm-arm, has a screw-surface at 25, that comes into contact with the screw *s*.

With this character of instrument it is preferable to have the cylinder A upon a vertical shaft, and the sleeve *t* and diaphragm will be moved vertically. For this purpose the fixed stand 28 is vertical, and upon it is a tube, 29, of a size to receive the sleeve *t*, and having a groove and key, by which the sleeve *t* is allowed to slide endwise of the tube 29; but the two can be turned together on the stand or shaft 28. An arm, 30, on the tube 29, and a spring, serve to turn the tube, the sleeve, and the diaphragm and arm with sufficient force to bring the point D to bear upon the foil with the required force.

It is preferable to employ with the diaphragm a tube, *r*, and mouth-piece *o'*, such tube being flexible.

The speaking into and recording of the sounds in the phonograph will be proceeded with as usual, and the reproduction of the sounds will be as before; but in case the operator wants to suspend the recording in the phonograph or the speaking in the phonet he simply has to draw upon the flexible tube, which swings the parts so as to disconnect the screw-rack from the flange *s* of the cylinder.

This at the same time moves away the recording or the phonet-point. The cylinder A can continue to revolve, and when the operator is ready he releases the pull upon the flexible tube, and the parts commence to act again at the exact place where the operation was suspended, because the screw-threads will only drop together when the proper part of the thread *s* comes to the corresponding part on the rack 25.

I employ the cam 33 and its lever upon the sleeve *t* to act upon the tube 29 and prevent the sleeve falling when the screw-threads are disconnected. This cam-lever 33 is self-acting, and it has to be raised when the sleeve *t* is to be lowered, so as to recommence at one end of the cylinder A.

By simply turning the sleeve and moving the diaphragm and the screw-surface back, the sleeve and diaphragm can be slipped endwise to any desired place upon the cylinder A to receive or deliver sounds.

I am aware that fly-wheels are employed in numerous ways for equalizing the speed of machinery. I do not claim the same, broadly. In experimenting with my phonograph I discovered that the reproduction of the sound was imperfect if the slightest variation occurred in the speed; hence the combination with the cylinder of a very heavy fly-wheel in proportion to the cylinder rendered perfect and reliable the action of the instrument in receiving and reproducing the sound by equalizing the speed.

I claim as my invention—

1. The combination, with the phonograph cylinder, shaft, and screw-surface, of a swinging nut or screw-surface, to connect or disconnect the parts that keep the recording or phonet point in position relative to the groove of the cylinder, substantially as set forth.

2. In combination with foil or a sound-recording surface, a point, a diaphragm, and a spring or damper acting to press the diaphragm toward the point, substantially as set forth.

3. In combination with a foil or sound-recording surface, a point, a diaphragm, and a spring between the point and the diaphragm, substantially as set forth.

4. The combination, in a phonograph or phonet, of a diaphragm, a point, and a lever intervening between the diaphragm and the point, substantially as set forth.

5. The combination, with the spirally-grooved cylinder in a phonograph, of a reel within the cylinder carrying the foil or similar recording material, a slot in the cylinder, through which the foil is led out, and means for clamping the foil, substantially as set forth.

6. The combination, with the cylinder A, of the sliding bar *o* and lever *x*, to clamp the foil and stretch the same, substantially as set forth.



7. The swinging sleeve *t*, having an arm that carries the diaphragm, in combination with the cylinder *A*, and rim *s*, having a screw-thread surface, substantially as set forth.

8. The tube 29 upon the fixed stud 28, in combination with the sliding sleeve *t*, the dia-

phragm, and the cylinder *A*. substantially as described and shown.

Signed by me this 19th day of March, 1879.  
THOMAS A. EDISON.

Witnesses:

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WM. CARMAN.

(No Model.)

4 Sheets—Sheet 1.

C. A. BELL & S. TAINTER.

RECORDING AND REPRODUCING SPEECH AND OTHER SOUNDS.

No. 341,214.

Patented May 4, 1886.

Fig. 1.

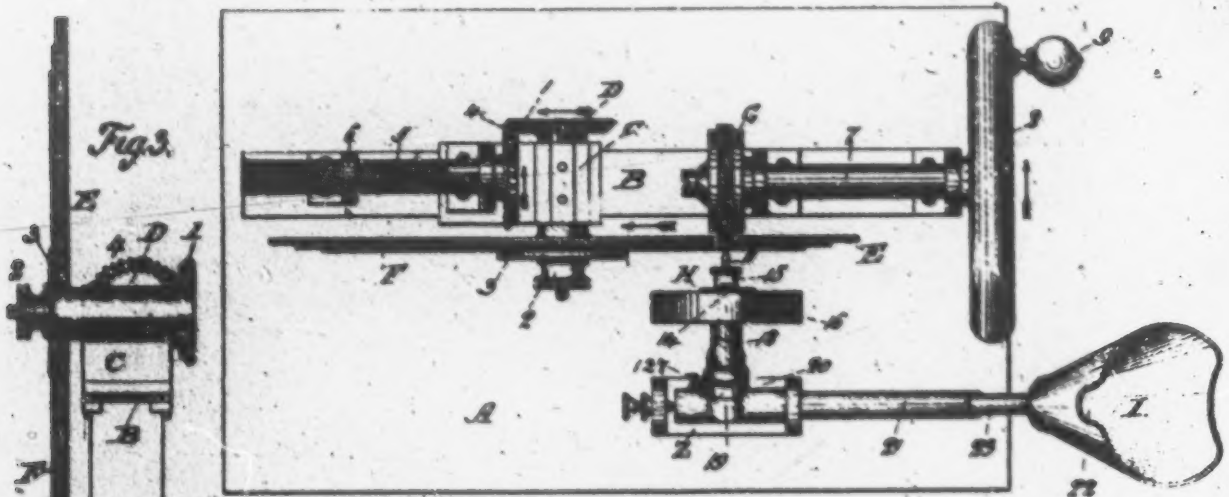


Fig. 2.

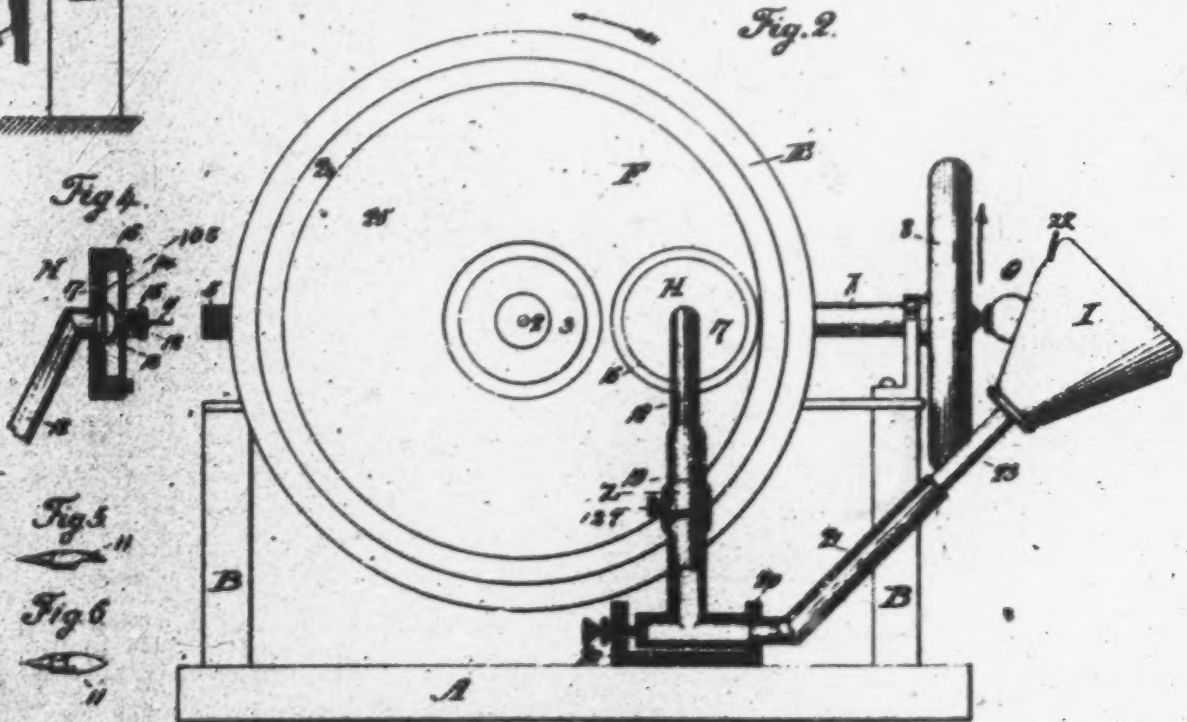


Fig. 3.



Fig. 4.

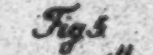


Fig. 5.



Fig. 6.



Fig. 7.

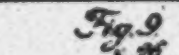


Fig. 8.



Fig. 9.



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C. A. BELL & S. TAINTER.

RECORDING AND REPRODUCING SPEECH AND OTHER SOUNDS.

No. 341,214.

Patented May 4, 1886.

Fig. 12.

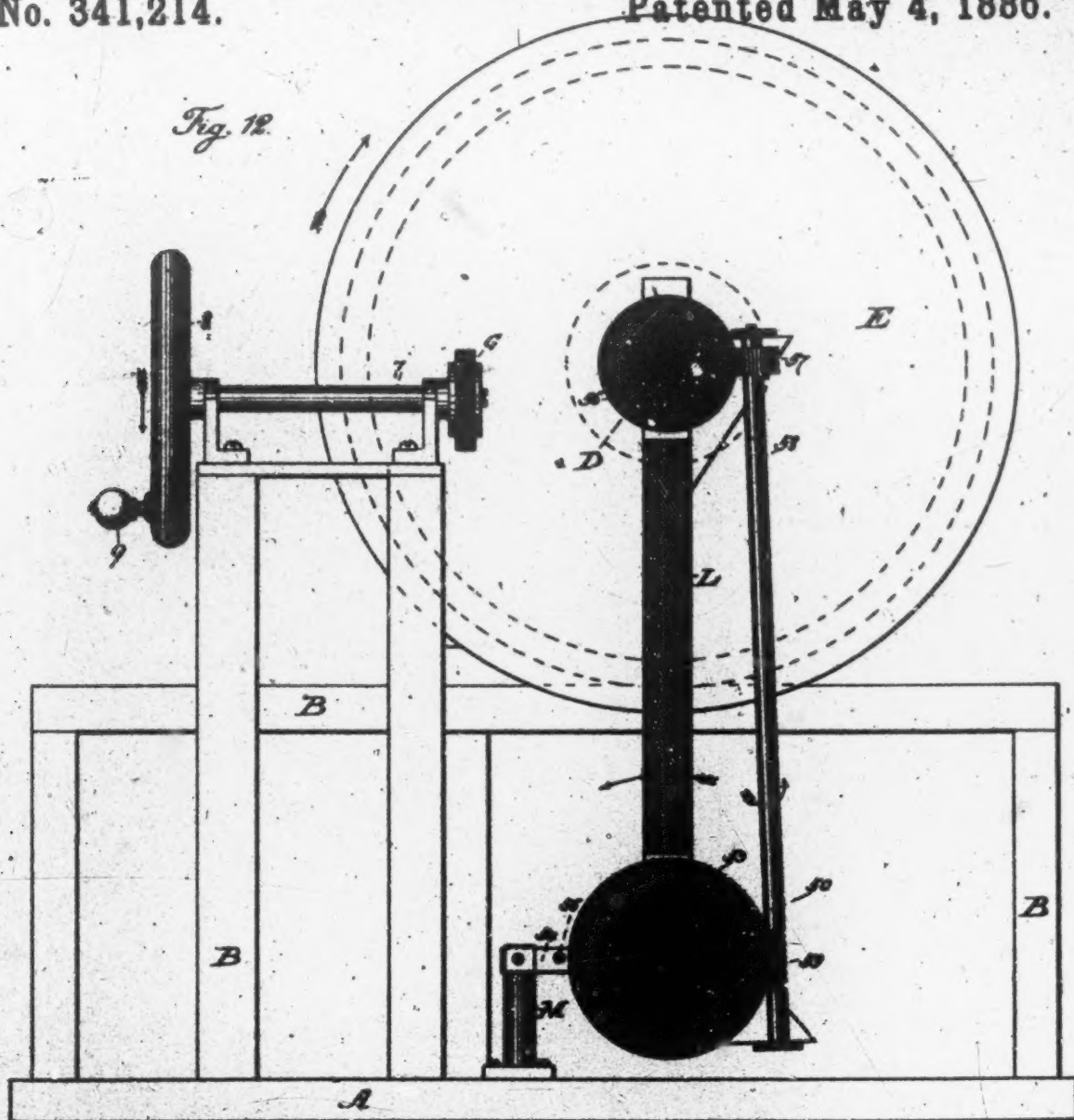
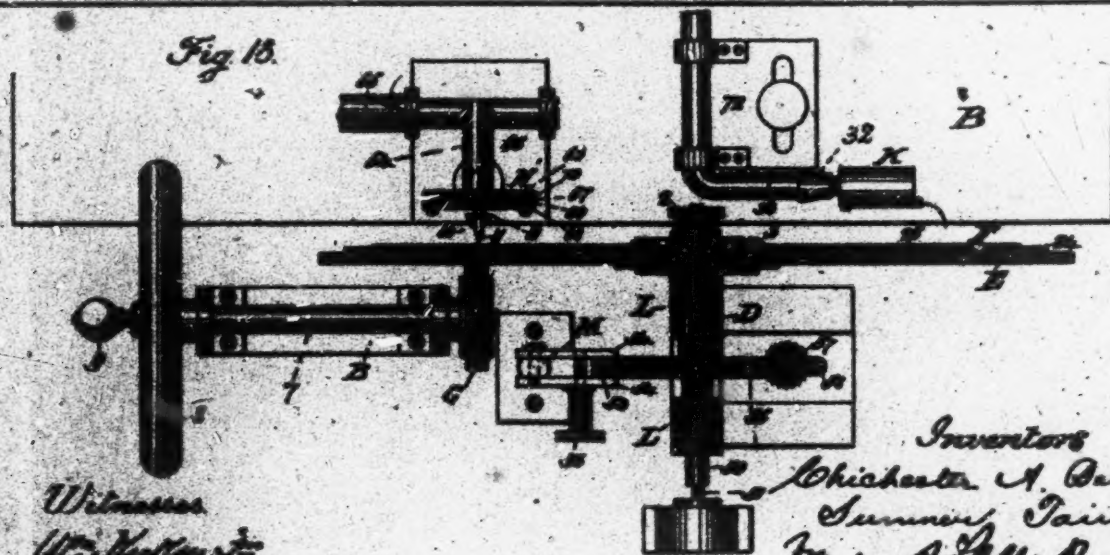


Fig. 13.



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4 Sheets—Sheet 3.

C. A. BELL & S. TAINTER.

RECORDING AND REPRODUCING SPEECH AND OTHER SOUNDS.

No. 341,214.

Patented May 4, 1886.

Fig. 14.

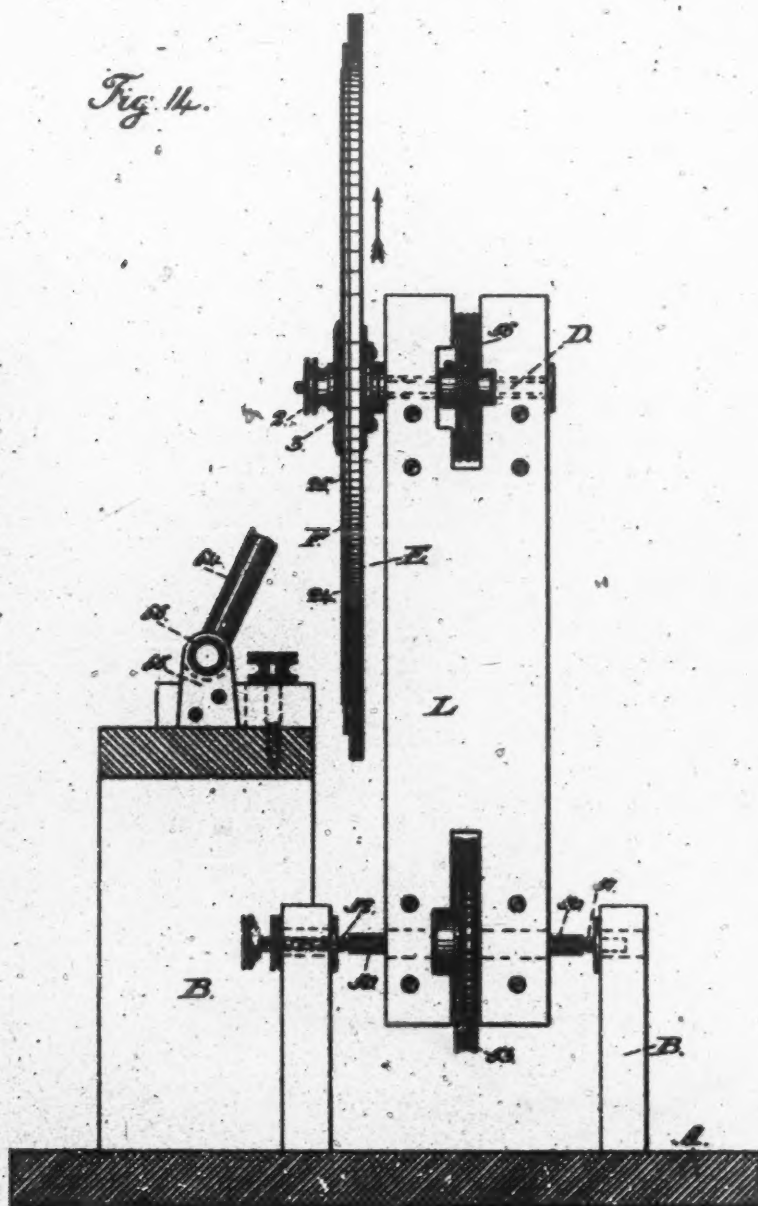


Fig. 21.

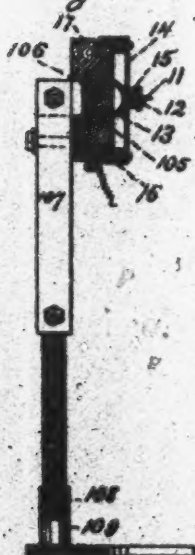


Fig. 15.



Fig. 16.



Fig. 17.



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(No Model.)

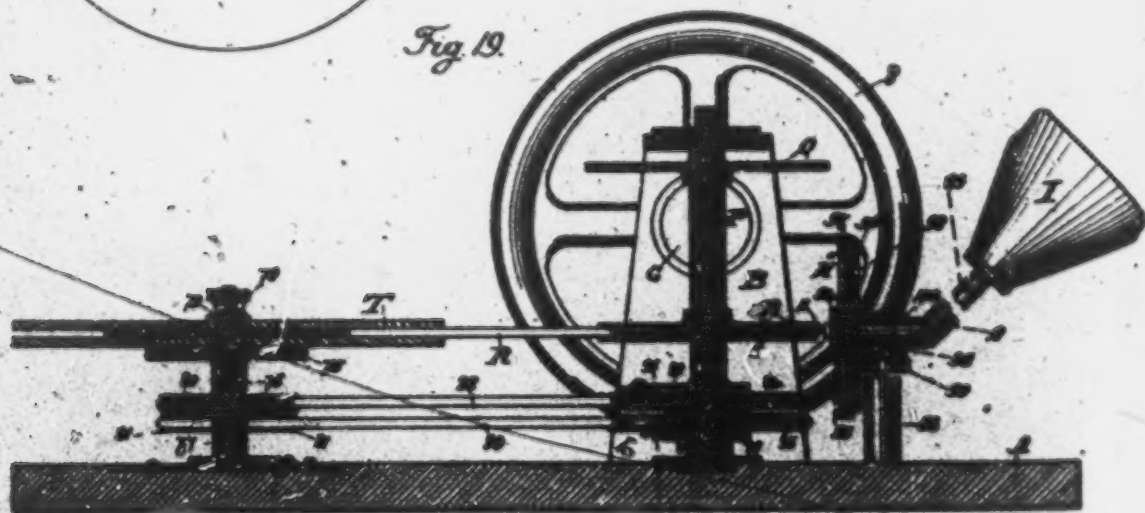
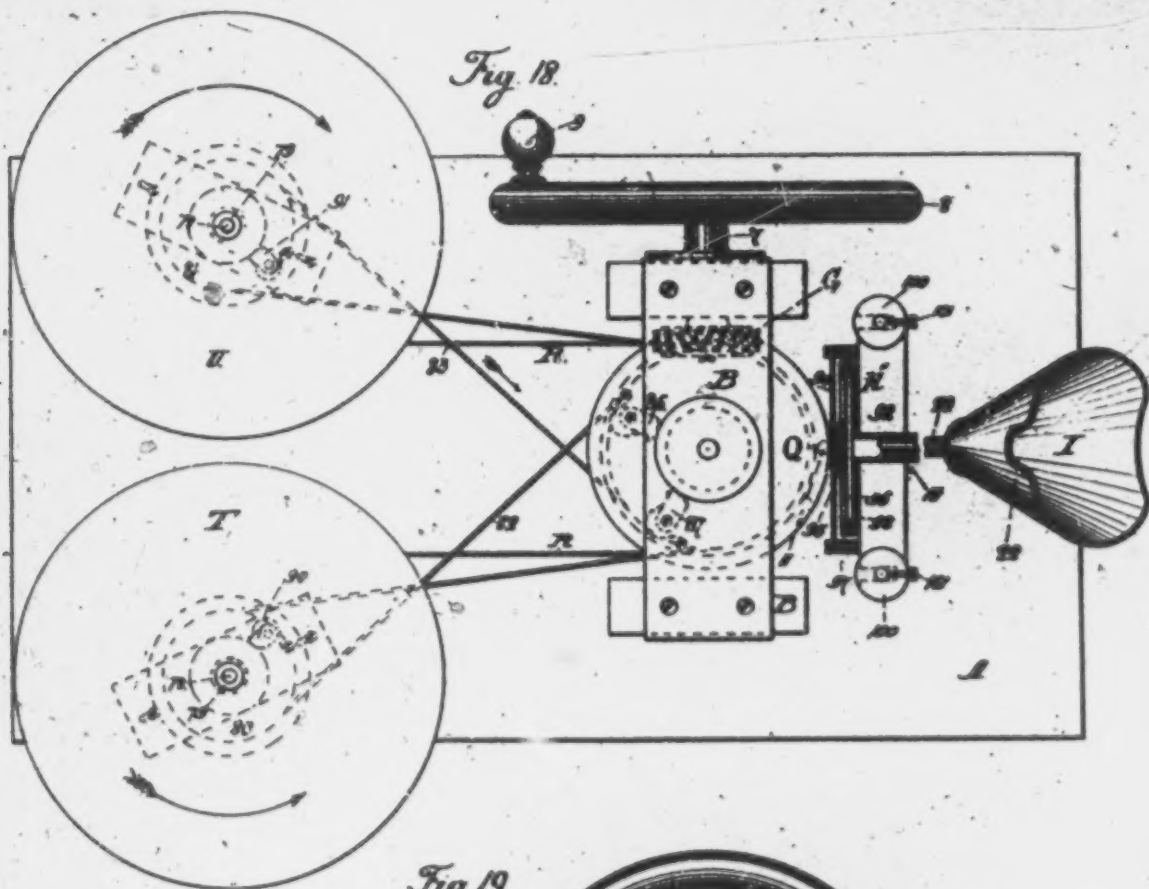
4 Sheets—Sheet 4.

C. A. BELL & S. TAINTER.

RECORDING AND REPRODUCING SPEECH AND OTHER SOUNDS.

No. 341,214.

Patented May 4, 1886.



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Inventors  
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their attorney



# UNITED STATES PATENT OFFICE.

ORCHESTER A. BELL AND SUMNER TAINTER, OF WASHINGTON, D. C.

## RECORDING AND REPRODUCING SPEECH AND OTHER SOUNDS.

SPECIFICATION forming part of Letters Patent No. 941,212, dated May 4, 1899.

Application filed June 27, 1898. Serial No. 179,944. (No model.)

*To all whom it may concern:*

Be it known that we, ORCHESTER A. BELL and SUMNER TAINTER, both of Washington, in the District of Columbia, have invented a new and useful Improvement in Recording and Reproducing Speech and other Sounds, which improvement is fully set forth in the following specification.

This invention relates to the formation, in a solid substance, of elevations and depressions, or other inequalities corresponding more or less perfectly to the forms of sound-vibrations, and the reproduction, by means of such inequalities, of the sounds represented by them.

The invention consists, first, in the formation of the record or "phonogram," as it has been called, by means of a cutting-style which is vibrated by the sound-waves or sonorous vibrations to be recorded. The vibrations may be impressed upon the style directly by the impact of the sound-waves upon some device mechanically connected with or carried by the cutting-style or its support, or indirectly through the action of an electric current or other suitable vibratory medium. Heretofore a large number of contrivances have been devised for converting electrical impulses into mechanical vibrations, and they could, of course, be used for vibrating the cutting-style. Otherwise they have no relation to this part of the present invention, the essential new feature of which is the removal of material to form the record by a cutting, gouging, or graving action of the vibrating style. Heretofore the vibrating style has, as in Edison's well-known phonograph, simply indented the recording material. It has been proposed to cut the record in the edge of a strip of metal or other solid material by vibrating the strip in contact with the cutting edge of a rotary disk cutter; but this proposal is essentially different from this invention, the new mode being applicable to cutting the record upon all sorts of surfaces, and not upon strips only, and is, besides, believed to be later in time than this invention. Under this part of the invention are included the vibratory cutting-style as a new device in a sound-recorder, and the combination of the same with other devices; also the cut or engraved record itself. In this new or improved form of record not only may a larger number of words or sounds be recorded in a given surface than has

been practicable with the indented records heretofore in use, but the recorded vibrations are also sharper and better defined. It is found that an indenting style smooths over the crests of the larger elevations, and also rubs out some of the finer ones.

The invention consists, secondly, in engraving or cutting the record in a waxy or amorphous, and slightly cohesive substance. Preferably, a compound of beeswax and paraffine (the latter in excess) is employed. This compound has no tendency to clog the style, but is readily removed thereby in chips or shavings. This part of the invention also consists in a recording material composed of a wax or waxy surface on a paper or pasteboard foundation. Heretofore it has been proposed to use soft paper saturated or coated with paraffine as the material for recording by the indenting method; but its use does not appear to have been successful, and an outer layer of tin-foil was therefore employed to receive the indentations.

The invention consists, thirdly, in cutting or engraving the record in the form of a groove with sloping walls, the sound-waves being represented by elevations and depressions at the bottom of the groove or otherwise. The advantage of this form of record is that it forms an efficient guide to the reproducing-style.

The invention consists, fourthly, in loosely mounting the reproducing-style so that it can readily be guided by the record. Preferably the reproducing-style, or rather what may be called the "head" of the reproducing instrument is mounted on an universal joint, and the style is pressed against the record by the yielding pressure of a spring or weight. Practically in the instruments made by us the pressure is due to the weight of the instrument, modified by the elasticity of a section of soft-rubber tube, which supports the same and constitutes a universal joint; but evidently there are many devices which can be used to mount the reproducer, so that it is free to follow the sound record, or phonogram, and which, therefore, would be within the spirit of the invention. The reproducing-style, mounted as just explained, is specially adapted for use in connection with a record in the form of a groove with sloping walls, and this



combination is specially claimed; but it may also be usefully employed in connection with other forms of record.

The invention consists, fifthly, in reproducing directly from the wax record. It is found that such a record has sufficient strength to withstand the rubbing action of the reproducing-style, so that a considerable number of reproductions can be obtained from it. The smoothness of the wax gives it a great advantage in this regard. So far as we are aware, no one has reproduced sounds from a wax record by rubbing a style or reproducer over it.

The invention consists, sixthly, in a reproducer or reproducing instrument in which the reproducing-style, instead of being placed behind its support, projects at the point beyond the edge thereof. One practical advantage of this is that it enables the position of the style on the record or phonogram readily to be observed.

The invention consists, seventhly, in cutting the sound-record in a fusible material, (the waxy compound before referred to, for example,) and then melting the surface slightly, so as to remove any roughness left by the cutting-style. These roughnesses are altogether outside of the sound-vibrations, and give rise in reproducing to scraping noises, which interfere with the intelligibility of the sounds reproduced. These scraping noises are greater with some other modes of reproducing which we have devised, and which will form the subject of other patents, than they are with a rubbing style; but even with the latter the additional smoothness given to the surface by the partial fusion has some advantage.

The invention consists, eighthly, in a sound-recorder having a cutting or graving style which is held by elastic or yielding pressure against the surface on which the record is to be made. The object is to enable the vibratory graver or cutting style to ride over instead of plowing through any elevations on the recording surface. The depth to which the point of the cutting-style is embedded in the record affects the amplitude of the style's vibration. By this improvement the depth is kept uniform, notwithstanding any slight unevenness of the recording surface.

The invention consists, ninthly, in having the recorder, of whatever description, or the reproducer, or both, rest against the tablet or recording material by gravity.

The invention consists, tenthly, in combining, with a sound-recorder or recording-instrument of any suitable description, and especially with one having a cutting-style, a tube or hollow standard on which the recorder is mounted, and through which the sound-waves are conveyed to the ear. This part of the invention also consists in supporting this hollow standard on a hinge, and having a sound-conveying tube communicate with the interior thereof through the hinge. This part of the invention further consists in supporting the reproducer or reproducing-instrument on a

hollow sound-conveying standard, the same as explained with respect to the recorder, and in similarly connecting the hollow standard of the reproducer with an exterior sound-conveying tube.

The invention consists, eleventhly, in combining with the recorder a mouth-piece so shaped as to include the nose of the user. It is found desirable to concentrate the sound-waves as much as possible upon the recording instrument or style, and if an ordinary mouth-piece be used the sound reproduced from the record is imperfect in the nasal elements, and sounds somewhat like the speech of a person with a cold in his head. By the use of the improved mouth-piece this disagreeable quality of the reproduced sound is avoided.

The invention consists, twelfthly, in a reproducer in which the sonorous vibrations impressed by the record upon the style are by the latter communicated to a block, plate, or other body of hard rubber, and through said body are transmitted to the air or to other vibratory medium. It is found that this material (hard rubber) gives much purer sounds than metal and other substances heretofore employed. It appears to absorb minute vibrations which give rise to scratching noises, and also to communicate sonorous vibrations without at the same time adding any foreign vibrations due to the movements of its own particles among themselves. The result is probably due to the high elasticity and the homogeneity of hard rubber.

The invention consists, thirteenthly, in combining with the disk of a recording and reproducing apparatus, in which the record is formed on the face of said disk in a volute or spiral by cutting or otherwise by any known or suitable means mechanism for giving to said disk a uniform surface-speed under the recorder. Heretofore when the record was formed on the face of a disk the latter has been given a uniform rotation, so that the same number of words were recorded in the outermost circles, as in the smaller inner ones. By giving to the disk a uniform surface-speed under the recorder, or by making the times of each rotation inversely proportional to the distance of the recorder from the center of the disk, the record of any given word or sound will be of the same length at whatever part of the disk it may be, and in this way it is possible considerably to increase the number of words or sounds on a given area.

The invention further comprises certain special constructions, combinations, and arrangements of parts, as hereinafter set forth.

Having now explained the principle of the invention, the manner in which the same is or may be applied will now be explained with reference to the accompanying drawings, which make part of this specification.

Figure 1 is a plan view of an apparatus constructed in accordance with the invention, arranged for recording; Figs. 2 and 3, respectively, a front elevation and cross-section of



the same; Fig. 4, a view in section and elevation of the recorder; Figs. 5 and 6, views on an enlarged scale of the graver or cutting style; Figs. 7 and 8, views in elevation and section respectively, of the reproducer; Figs. 9 and 10, similar views of another form of reproducer; and Fig. 11, an elevation of the sound-conveying tube for use with the reproducer. Figs. 12 to 17 represent a modified form of apparatus, Fig. 12 being a back view, partly in section; Fig. 13, a plan, partly in section; Fig. 14, an edge view, partly in section; Figs. 15 and 16, views in elevation and section of the recorder, and Fig. 17 an edge view of a friction-clamp making part of the apparatus. Figs. 18 and 19 are plan and longitudinal sections, respectively, of a form of apparatus also constructed in accordance with the invention, or with parts thereof in which the record is made on a strip, and Fig. 20 a plan, partly in section, of the reproducer for use with such apparatus. Fig. 21 is a view of a recorder in which the style is operated electrically.

Referring to Figs. 1 to 11, A is the base or bed of the apparatus, and B an upright frame, which carries the mechanism for supporting and moving the tablet F, (shown as a disk,) on which the record is to be or has been formed. In the slide C, movable in ways of the frame B, is journaled an arbor, D, on which are fixed a metal disk, E, at one end and a bevel-gear, 1, at the other. The arbor projects beyond the metal disk E, so as to form a support for the recording-tablet F, which is retained thereon by the nut 2 and washer 3. The metal disk E performs the double function of a friction-wheel and of a backing to the recording-tablet F. The bevel-gear 1 engages a similar gear, 4, on the end of the screw 5, which is journaled in a bearing in the slide C, and is tapped through a stationary lug, 6, on the frame B. As the arbor D is revolved, the screw 5 is turned also, and in consequence of its engagement with the lug 6 it moves the slide C lengthwise of the frame B. The rotation is communicated to the arbor from the shaft 7, journaled in bearings of the frame B, and provided at one end with a fly-wheel, 8, and crank-handle 9, and at the other with a friction-pinion, G. This pinion is formed, as shown, of rubber disks clamped together between metal washers. It bears against the back of metal disk E, and communicates motion to it. As the slide C is moved by the action of the screw 5, the metal disk E is carried past the friction-pinion, so that it touches the metal disk in a spiral line, and serves to give a uniform surface-speed to each part of the disk as it in turn comes opposite said pinion. The recorder H is placed on the opposite side of the metal disk E, preferably as shown, with the point c' of the graver or cutting style 11 directly opposite the point where the pinion G touches the disk E. The said pinion thus acts as a support to the disk against the action of the cutting or recording style. The latter is preferably formed of a round

wire by turning the end central and rounding the extremity, and then grinding or cutting the end of the wire to the desired shape.

The style 11 is made of a material and is not simply displaced by the material and is set in one end of a block 12, provided on the opposite end with a nut 13, (see Fig. 4,) and secured in the cross-piece 14 by the nut 15. The cross-piece 14 is secured to a ring, 16, into which a back plate 17, is secured. These parts, except the metal style, are preferably of hard rubber, although they could be made of another material, of brass, for example. A sound-conveying tube, 18, is screwed into the back plate, 17, the end being just behind the cup 13. A diaphragm, 100, of any suitable material, whose edges are clamped between the ring 16 and back plate, 17, is placed behind the cup 13, which is pressed against said diaphragm by the elasticity of cross-piece 14. The cup 13 and block 12 serve to communicate the vibrations from the diaphragm to the recording-style.

The tube 18 forms part of a hollow standard, upon which the recorder is mounted. The lower part, 19, of this standard is hinged in the bracket 20, as clearly shown in Fig. 2, so that it can be rocked to bring the recorder into or put it out of action.

On the tube or standard 19 is a ring-weight, Z, which is retained in position by a set-screw, 127. It therefore can be adjusted up or down, in order to increase or diminish the pressure of the style 11 against the tablet F. The use of this weight is desirable, but not necessary.

The tube 21 communicates with the interior of the hollow standard through the hinge, and does not therefore interfere with its freedom of motion. This tube 21 can be fixed in the bracket or can be allowed to turn, as may be preferred.

The mouth-piece I is shaped to fit the face of the user, and is provided with a notch, 22, to receive the nose. It is attached to the tube 23, which at its lower end fits snugly in the tube 21 and communicates through the series of tubes 23, 21, 19, and 18 with the space inside and back of the cup 13.

In operation the recorder rests by its own weight, assisted by the pressure of weight Z, or by its own weight alone, if preferred, against the recording-tablet F, said weight causing the style to embed itself to the proper extent in the recording material. The sonorous vibrations impressed upon the style are so rapid, as well as so minute, that the record is made as perfectly as if the recorder were held positively, while at the same time the recorder can be moved bodily to conform to the unevenness of the surface of the tablet, and thus keep uniform the depth at which the style operates.

The tablet F consists of a paper or paste-board foundation, 24, with a coating, 25, of



wax. A composition excellently adapted to the purpose, and according to our experience the best, consists of one part, by weight, of white beeswax and two parts of paraffine. The two bodies are melted together, and if not perfectly free from dirt and grit should be filtered. A filtration through cotton-wool will answer. The coating is or may be about one-twentieth of an inch in thickness, (the paper being one-tenth of an inch, more or less,) and can be made by flowing the melted composition over the paper disk or foundation. The surface is preferably turned off flat on a lathe.

In order to place the tablet in the machine, the recorder H is turned back out of the way. When the tablet has been secured in place, the recorder is turned forward into the position shown, the style resting against and slightly penetrating the wax coating. A penetration of one one-hundredth of an inch has been found very effective, the style being formed of No. 16 wire-shaped at the cutting end as in Figs. 5 and 6. Upon turning the fly-wheel 8 the disk B and tablet F will be turned, and the style 11 will cut or engrave a spiral line in the wax coating of the tablet. If one talks into the mouth-piece I, the style will be thrown into vibrations corresponding to the spoken words, and the engraved line will be of varying character, the inequalities or variations from uniformity representing the forms of the sound-waves.

The reproducer K, (shown in Figs. 7 and 8,) for reproducing from the engraved tablet, or from other suitable record the sounds which formed said records, has a reproducing-style, 26, formed of a narrow metal strip bent near the end, as shown in Fig. 8, and pointed, as shown in Fig. 7. This style is held by cementing, riveting, or otherwise, between the strip 27 and the circular plate 28, both preferably of hard rubber. The strip 27 is fastened at the bottom to an offset on the block 29, in which a passage is formed for the sound-waves. This passage terminates just behind the plate 28. There is a fixed disk, 30, of the same size as the movable plate 28. It is cemented or otherwise fastened on the face of the block, and is perforated at the center, in order not to obstruct the opening therein. The plate 28 is close to but not in contact with the disk. The tube 31, fixed at the upper end to the block 29, is joined at the lower end to the tube 32 by sections of soft flexible vulcanized-rubber tubing, 33. For use the tube 32 is slipped into the tube 31 in the manner shown for the tube 12 of the recorder.

The reproducer K when so placed is mounted upon a hollow standard composed of the tubes or tubing 21, 22, 23, and 18, and in consequence of the flexibility of the rubber tubing 33 it is free to follow the record. No special care is necessary to insure its adjustment, for if the reproducer K be allowed to rest against the record with the style upon the engraved line the style will of itself gravitate to the bottom of the groove.

There exists always a liability to disarrangement in some part of the machine either in the recorder or the support therefor with the recording-tablet or its support, or if there be no disarrangement it would be difficult to insure that the reproducing-style should touch the record precisely at the proper point if the reproducer be held rigidly. Difficulties on these accounts are avoided by the loose or flexible mounting of the reproducer, the style automatically adjusting itself to the proper place on the record. It will be seen that the reproducer is mounted on a universal joint, so that it can move in any direction. The movement parallel with the face of the tablet would, however, by itself allow the style to follow and adjust itself to the record to a useful extent.

In operation the reproducer K is placed against the record, and on turning the wheel 8 in the same direction and at about the same speed that it was turned in recording, the record will move the style 26 and plate 28, so as to throw the air in the hollow standard into vibrations, and produce sound-waves similar to those which originally acted upon the recording-style to make the record. The reproduced sounds are audible by placing the ear in proximity to the mouth-piece I; but it is preferred to withdraw said mouth-piece, and to connect the flexible tube 34 (see Fig. 11) with the tube 31 and listen at the ear-piece 35. After the record has been cut it will of course be understood that the machine is turned back to the starting-point for reproducing. The surface of the cut record can be rendered more smooth by removing the engraved tablet from the machine and exposing the surface to heat—as, for example, by rotating the tablet-face downward over an alcohol-lamp until the surface begins to glisten. Of course a too long exposure would destroy the record. It is the merest surface action that is required. The record can be used for reproducing without submitting it to this operation and without removing it from the machine. It may, however, be removed, and at any time thereafter replaced on the same or a similar machine, and be made to reproduce the original sounds.

The reproducer K' (shown in Figs. 9 and 10) has the style 26 attached to the outer of two light plates, 36 and 37, which are attached to a diaphragm, 38, of thin sheet rubber clamped at the edges between the ring 39 and the border of the back plate, 40. The tube 31 is fastened in the back plate.

It will be observed that in both forms of reproducer the style 26 projects beyond the edge or end of the instrument, so that the position of its point on the record can be easily seen.

Referring now to Figs. 12 to 17, A is the bed, B an upright frame, D an arbor, E a metal disk, F the tablet, and G a friction-pin, as in Figs. 1 to 11. The nut 2 and washer 2, the shaft 1, wheel 8, and crank 9, and the paper disk 24 and wax coating 25 are identical with the parts similarly numbered in Figs. 1,





tapped through the metal at the closed end of the slots, and bear at the point against the supporting-screws.

The reproducer K', Fig. 20, is similar to that shown in Figs. 9 and 10, except that the style 26 is so placed that the point is at the center instead of projecting beyond the edge of the instrument. Its position on the record is therefore not so readily seen; but with the form of machine shown in these figures this is an important. The same may be said of the loose mounting of the reproducer, although in point of fact the thin rubber diaphragm 38 gives a certain lateral play to the style. The tube 31 is rigidly fastened to a cross-piece, 102, identical with the cross-piece 92, and with said tube 31 the bearing-tube 30 and ear-piece 35 are connected.

The paper strip can be easily coated with the beeswax and paraffine compound by running the same through a body of melted composition and scraping one side, leaving what adheres to the other to harden thereon.

In Fig. 21 an arrangement for operating the recorder by electro-magnetism is shown. The magnet 107 is mounted on a bar, 108, journaled in bearings in standards 109. It is provided with a bobbin, 106, of wire, surrounding the pole-piece, which bobbin is included in a circuit over which electrical undulations are caused to pass by any suitable transmitting instrument—for example, such as commonly employed on telephone-lines. In front of the pole-piece or core of the bobbin is a diaphragm, 105, of magnetic material, whose edges are clamped between the ring 16 and back plate, 17. The cup 15 should always be in contact with diaphragm 105, and is pressed against it by the spring of piece 14. This cup, as well as the style 11, block 12, nut 15, and cross-piece 14, is the same as in the recorder H of Figs. 1 and 4.

It is evident that various modifications other than those indicated can be made and the invention still be employed in whole or in part, and also that parts of the invention may be used separately.

In the foregoing description details have been given with some minuteness. This has been done to furnish the best information in our power for enabling those skilled in the art to make and use the invention, and not with the intention of limiting the invention to the precise dimensions, proportions, shapes, and materials stated.

A means has been shown for impressing vibrations upon the recording-style by an electrical current through the intermediary of an electric magnet, in a manner similar to that in which the diaphragm of an ordinary receiving-telephone has been vibrated.

It is evident that other means heretofore used for vibrating a diaphragm could be used in place of the magnet; also, it is evident that the vibrations of the reproducing-style could be taken up and transmitted by the means heretofore used for taking up and transmit-

ting vibrations, (those of a telephone-diaphragm, for example.)

The term "cutting" is herein employed to indicate an action in which the material is removed in chips, shavings, or other small pieces—as in engraving, turning, and the like—and not simply displaced.

The displacement of the material is not only a different operation from the cutting contemplated by this invention, but is not calculated to accomplish the objects for which cutting or graving is employed.

Having now fully described our said invention and the manner in which the same is or may be carried into effect, what we claim is—

1. The method of forming a record of sounds by impressing sonorous vibrations upon a style, and thereby cutting in a solid body the record corresponding in form to the sound-waves, in contradistinction to the formation of sound-records by indenting a foil with a vibratory style, or cutting a strip by vibrating it against a revolving disk-cutter, substantially as described.

2. The method of forming a sound-record by impressing the sonorous vibrations upon a style in a direction at right angles to the recording-surface, and thereby cutting in a solid body a series of elevations and depressions of varying depth, corresponding in form to the sound-waves, substantially as described.

3. The vibratory cutting-style of a sound-recorder, substantially as described.

4. The cutting-style, in combination with a support permitting the same to be vibrated, and means for impressing sonorous vibrations thereon, substantially as described.

5. A vibratory cutting style, in combination with a sound-conveying tube for concentrating the sound-waves upon the style, substantially as described.

6. A vibratory cutting-style, in combination with a tablet or other solid body in which the record is to be cut, and mechanism for supporting the same and moving it with reference to the said style, substantially as described.

7. A sound-record consisting of a tablet or other solid body having its surface cut or engraved with narrow lines of irregular or varied form corresponding to sound-waves, substantially as described.

8. A sound-record consisting of a tablet or solid body having its surface cut or engraved with a number of lines of variable cross-section, the irregularities or variations corresponding in form to sound-waves, substantially as described.

9. The method of forming sound or speech record which consists in engraving or cutting the same in wax or a wax-like composition, substantially as described.

10. The sound or speech record cut or engraved in wax or a wax-like composition, substantially as described.

11. The recording-tablet of a phonograph or sound-recording machine, having as the material for recording sounds or sonorous vibra-



tions the composition of beeswax and paraffine, substantially as described.

12. The sound or speech record cut or engraved in a wax-like composition, such as the compound of beeswax and paraffine, substantially as described.

13. A tablet or body for recording sound-vibrations, consisting of a paper or pasteboard foundation and a surface-coating of beeswax and paraffine compound, substantially as described.

14. The sound or speech record cut or engraved in a wax-like composition, such as the described compound of beeswax and paraffine, constituting a surface-coating to a paper or pasteboard foundation, substantially as described.

15. The method of making a sound or speech record which consists in engraving or cutting in the recording material an irregular groove with sloping walls, the shape of the groove representing the sound-vibrations, substantially as described.

16. The method of making a sound or speech record which consists in cutting in the recording material a groove with sloping walls and of variable cross-section, the variations corresponding in form to sound-waves, substantially as described.

17. The sound-record in the form of an irregular groove with sloping walls cut in solid material, substantially as described.

18. The sound-record cut in wax or wax-like composition in the form of an irregular groove with sloping walls, substantially as described.

19. The combination, with a reproducing-style, of a mounting therefor, which leaves said style-face to move laterally, and thereby adjust itself automatically to a sound-record, substantially as described.

20. The reproducer loosely mounted on a suitable support, so that the reproducing-style is capable of a lateral movement, and may in consequence thereof adjust itself automatically on the record, substantially as described.

21. The reproducer mounted on a universal joint and held against the record by yielding pressure, substantially as described.

22. The combination, with a grooved tablet or other body having a sound-record formed therein, of a reproducer having a rubbing-style loosely mounted so that it is free to move laterally, and then adjust itself to the groove, substantially as described.

23. The combination, with the tablet or other body having the sound record formed therein as an irregular groove with sloping walls, of a reproducer having a style for rubbing over said record and mounted on a universal joint, substantially as described.

24. The combination, with a sound-record formed in wax or a wax-like material, of a reproducer having a rubbing style for receiving numerous vibrations from said record, substantially as described.

25. A reproducer having a style projecting

beyond the edge or end of the instrument, so that the position of the point of the style on the record may readily be seen, substantially as described.

26. Is a reproducer, the combination, with a vibratory plate or diaphragm, of a reproducing-style between said diaphragm and plate or diaphragm and held at the end, substantially as described.

27. The method of recording and reproducing sounds by cutting the record in a wax or wax-like material, and then rubbing over the record the style of a suitable reproducing instrument, so as to impart vibrations on said style, substantially as described.

28. The method of improving a sound record which consists in producing an incipient fusion of the surface, substantially as described.

29. The improvement in producing a sound-record, consisting in cutting the record in a fusible material, and then producing an incipient fusion of the surface, substantially as described.

30. The sound-recorder having a vibratory cutting-style held against the recording material by yielding pressure, substantially as described.

31. The recording-instrument having a vibratory cutting-style and mounted on a hinged arm, substantially as described.

32. The combination, with the tablet or body in which the sound-record is to be made, of the recording-instrument mounted on a hinged arm and resting by gravity against the tablet, substantially as described.

33. The recorder mounted on a hollow arm or standard, which constitutes also a sound-conveyor, substantially as described.

34. The recorder mounted upon an arm or standard hinged to its bracket or base, and provided with a sound-conveyor extending lengthwise of said arm, substantially as described.

35. The recorder mounted upon a hinged arm, and combined with a sound-conveyor which extends lengthwise of the arm, and is connected at the hinge with an exterior sound-conveyor, substantially as described.

36. The reproducer mounted upon a hollow standard which forms a sound-conveyor, substantially as described.

37. The reproducer mounted on a hinged arm, and provided with a sound-conveyor extending lengthwise of said arm, substantially as described.

38. The reproducer mounted on a hinged arm, and provided with a sound-conveyor extending lengthwise of said arm, and connected at the hinge with an exterior sound-conveyor, substantially as described.

39. The combination, with a sound-recorder, of a mouth-piece shaped to surround the mouth and nose of the user, and to concentrate the sound upon the recording device, substantially as described.

40. The combination, with the tablet, in the form of a disk, and a recorder or reproducer,



of mechanism for causing a spiral line to be traced on the disk by the recorder or reproducer at a uniform surface-speed, substantially as described.

5 41. The combination, with the tablet, in the form of a disk, the arbor, and the metal disk operating as a friction-wheel, of the slide, or its equivalent, such as herein shown, in which said arbor is journaled, and the friction-pinion  
10 for revolving said disk, substantially as described.

42. The combination, with the recorder or the reproducer, the disk, the arbor, and the later-  
15 ally-movable support to the arbor, of the friction-pinion placed behind and bearing against the disk at a point opposite the recorder or reproducer, substantially as described.

43. The combination, with a recording-style and the support therefor, of a cup on the back  
20 of said support, and the sound-conveying tube terminating just behind the cup, substantially as described.

44. In combination with the style of a sound-reproducer, a vibratory body or plate  
25 of hard rubber, upon which vibrations are impressed by said style, and through which they are transmitted, substantially as described.

45. A tablet provided with a wax or wax-like coating, and having engraved in said coating a spiral line with inequalities or irregularities corresponding in form to sound-waves, substantially as described.

46. A tablet provided with a coating of wax or wax-like composition, and having a sound-record engraved in said coating, said engraved coating having the glazed surface which results from an incipient fusion of the wax after cutting or engraving the record, substantially as described.

47. In combination with a sound-recorder, a flaring mouth-piece shaped to fit over the face of the user and to include his nose, and communicating through a tube or contracted opening with the space behind the diaphragm of said recorder, substantially as described.

In testimony whereof we have signed this specification in presence of two subscribing witnesses.

CHICHESTER A. BELL  
SUMNER TAINTER.

Witnesses:

PHILIP MAURO,  
C. J. HEDRICK.



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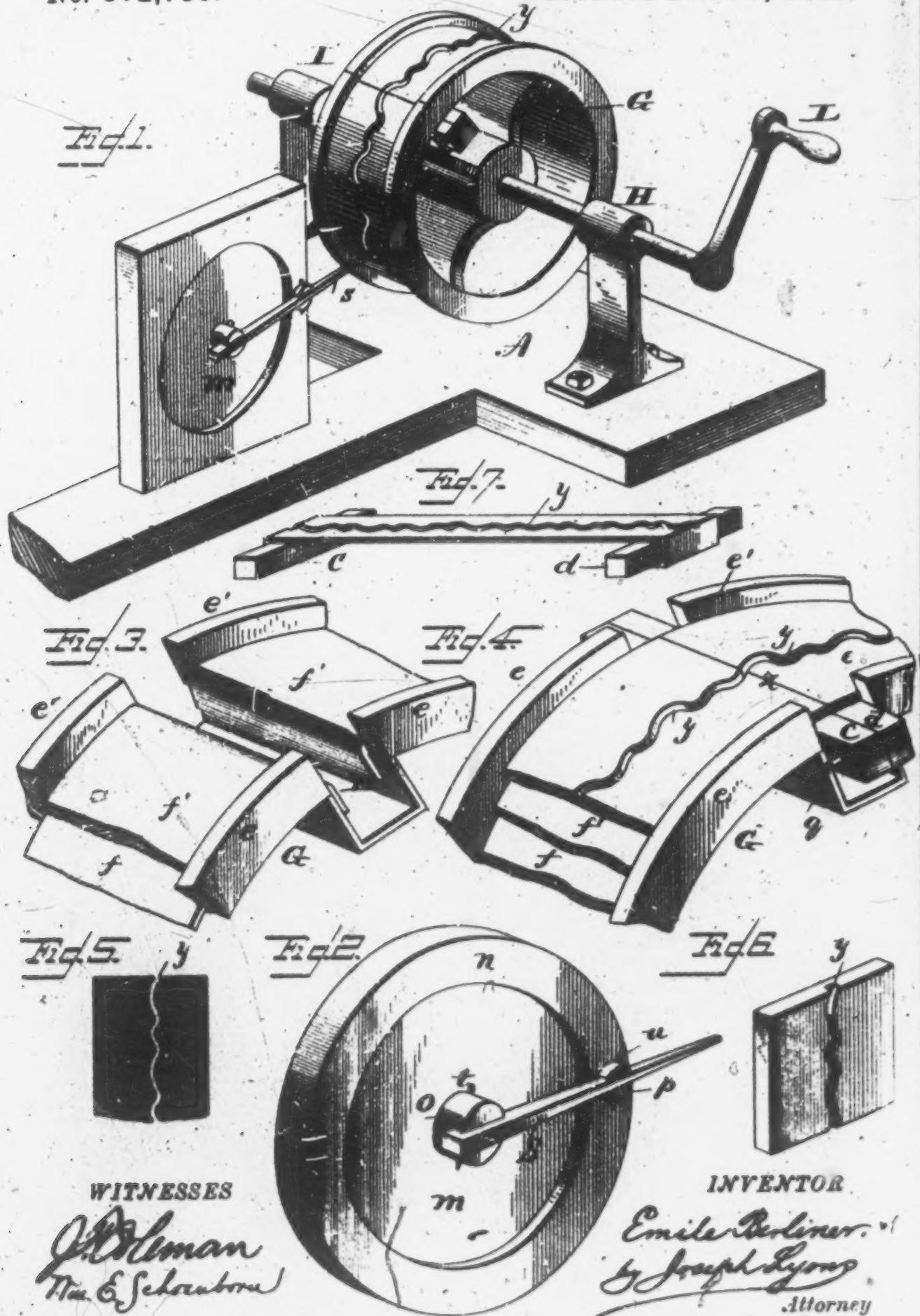
(No Model.)

E. BERLINER.

GRAMOPHONE.

No. 372,786.

Patented Nov. 8, 1887.



WITNESSES

*J. H. Heman*  
*Thos. E. Schreiner*

INVENTOR

*Emile Berliner*  
*by Joseph Lyons*  
Attorney

# UNITED STATES PATENT OFFICE.

EMILE BERLINER, OF WASHINGTON, DISTRICT OF COLUMBIA.

## GRAMOPHONE.

SPECIFICATION forming part of Letters Patent No. 872,786, dated November 8, 1867.

Original application filed May 4, 1867, Serial No. 127,922. Divided and this application filed September 25, 1867. Serial No. 258,721. (No model.)

To all whom it may concern:

Be it known that I, EMILE BERLINER, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Gramophones, of which the following is a specification.

This invention has reference to a novel method of and apparatus for recording and reproducing all kinds of sounds, including spoken words, and is designed to overcome the defects inherent in that art as now practiced and in the apparatus used therefor.

By the ordinary method of recording spoken words or other sounds for reproduction it is attempted to cause a stylus attached to a vibratory diaphragm to indent a traveling sheet of tin-foil or other like substance to a depth varying in accordance with the amplitudes of the sound-waves to be recorded. This attempt is necessarily more or less ineffective, for the reason that the force of a diaphragm vibrating under the impact of sound-waves is very weak, and that in the act of overcoming the resistance of the tin-foil or other material the vibrations of the diaphragm are not only weakened, but are also modified. Thus while the record contains as many undulations as the sounds which produce it, and in the same order of succession, the character of the recorded undulations is more or less different from those of the sounds uttered against the diaphragm. There is, then, a true record of the pitch, but a distorted record of the quality of the sounds obtained. The simple statement that the material upon which the record is made resists the movement of the diaphragm is not sufficient to explain the distortion of the character of the undulations, for if that resistance were uniform, or even proportional to the displacement of the stylus, the record would be simply weakened, but not distorted; but it is a fact that the resistance of any material to indentation increases faster than the depth of indentation, so that a vibration of greater amplitude of the stylus meets with a disproportionately greater resistance than a vibration of smaller amplitude. For this reason loud sounds are even less accurately recorded than faint sounds, and the individual voice of a loud speaker recorded and then reproduced by the phonograph cannot be recognized. With a view of

overcoming this defect it has been attempted to engrave instead of indent a record of the vibrations of the diaphragm by employing a stylus shaped and operating like a chisel upon a suitably-prepared surface; but even in this case the disturbing causes above referred to are still present. In addition to this, if in the apparatus of the phonograph or graphophone type it is attempted to avoid the disturbing influence of the increase of resistance of the record-surface with the depth of indentation or cut as much as possible by primarily adjusting the stylus so as to touch the record-surface only lightly, then another disturbing influence is brought into existence by the fact that with such adjustment, when the diaphragm moves outwardly, the stylus will leave the record-surface entirely, so that part of each vibration will not be recorded at all. This is more particularly the case when loud sounds are recorded, and it manifests itself in the reproduction, which then yields quite unintelligible sounds.

It is the object of my invention to overcome these difficulties by recording spoken words or other sounds without perceptible friction between the recording-surface and the recording-stylus, and by maintaining the unavoidable friction uniform for all vibrations of the diaphragm. The record thus obtained, almost frictionless, I copy in a solid resisting material by any of the methods hereinafter described, and I employ such copy of the original record for the reproduction of the recorded sounds.

Instead of moving the recording-stylus at right angles to and against the record-surface, I cause the same to move under the influence of sound-waves parallel with and barely in contact with such surface, which latter is covered with a layer of any material that offers a minimum resistance to the action of a stylus operating to displace the same, all substantially in the manner of the well-known phonautograph by Leon Scott. All this will more fully appear from the following detailed description, in which reference is made to the accompanying drawings, which illustrate one of the numerous forms which my improved apparatus may assume, and in which—

Figure 1 is a perspective view of my recording and reproducing apparatus; Fig. 2, a like



view of the recording and reproducing diaphragm with its stylus; Fig. 3, a similar view of a portion of the support for the record-surface; Fig. 4, the same view with the record-surface applied; Fig. 5, a plan view of a phonautographic record; Fig. 6, a perspective of a phonautographic record copied in solid resisting material; and Fig. 7, the copied record mounted, ready for application to the support.

The general arrangement of the parts is best illustrated in Fig. 1, in which a T-shaped base-plate, A, is shown, upon which two standards, H I, serving as journal-bearings for the shaft of drum G, are mounted. The drum G may be constructed with flanges *e e'*, which project beyond the cylinder-surface *f*, and from the edges of a gap, B, left upon the cylinder-surface extend the side walls of box K, as shown. A thin layer of felt or other yielding elastic substance is placed upon the cylinder-surface and is bent over the edges of the gap and secured to the side walls of the box K. This layer of elastic material is designed to serve as the support for the record-surface both in recording and reproducing.

For recording I employ a thin strip of paper, parchment, metal, or any other suitable substance, which is secured at both ends to bars *c d*, in the manner shown in Fig. 7, with reference to a copy of a record, and is then placed upon the elastic support *f*, with the bars *c d* entering into but projecting at both ends beyond the box K, as illustrated in Figs. 1 and 4, with reference to an engraved copy of a record. Bolts *g*, passing through the projecting ends of bars *c d*, are employed to draw the record strip tightly about the drum, and the length of the strip is such that the ends of the same meet as nearly as practicable upon a straight line, *a*. The record-sheet is then prepared to receive the record by covering its surface with a thin layer of any substance which is easily removed by the action of the recording-stylus. I may use lamp-black, which is deposited by placing a smoky flame under the record-strip and by slowly turning the drum until all parts of the strip are covered with the deposit. It is well known that a layer of lamp-black thus deposited, while it adheres well to the surface of a solid body, is nevertheless easily removed from the same. It requires only an exceedingly small force to draw a plainly visible line upon such surface, owing to the fact that the spicules of carbon of which lamp-black is composed are only loosely superimposed upon each other, and are exceedingly light. All this has long since been recognized and utilized in the production of phonautographic records, and I take advantage of these facts in my improved method of recording and reproducing sounds.

The diaphragm *a* is mounted in a frame, *n*, with its plane at right angles to the axis of drum G. A post, O, is fixed to the center of the diaphragm, and a slot in said post receives one end of stylus S, which is pivoted in the

post by a pin, *t*. The stylus extends over and beyond the frame, with its free end barely in contact with the record-surface, and is also pivotally supported in a slot in a post, *p*, secured to the frame by means of a pin, *u*, as shown in Figs. 1 and 2. It will now be seen that the stylus is in effect a lever having its fulcrum in the pin *u*, and that its free end can only move in lines practically parallel to the record-surface. If it is now desired to produce a record of sounds the drum is slowly and uniformly rotated by means of crank I, or by any other suitable means, and sounds are uttered or directed against the diaphragm. Under the impact of the sound-waves the diaphragm is set into vibrations, whereby the free end of the stylus is also caused to vibrate to the right and left of its normal position, removing at the same time an undulating line, *y*, of lamp-black from the record-surface, as indicated, greatly exaggerated, in Fig. 5. Since in this operation the stylus only penetrates a uniform layer of loosely-heaped carbon spicules and barely touches the record-surface, it is clear that the slight friction at the free end of the stylus will be uniform, whatever be the amplitude of vibration. Consequently the vibrations of the diaphragm will not be modified or changed by the reaction upon the same of a sensible and varying resistance, as is the case in all other mechanical sound-recorders.

Having thus obtained an accurate phonautographic record, the same may be fixed by applying a thin solution of varnish of any kind which dries very rapidly and which does not obliterate or change the record.

If in this process the deposit of lamp-black be made thick enough, the line drawn by the stylus would represent a groove of even depth, preserving all the characteristics of the sounds which produced it and which may be handled and touched with impunity. The latter is then removed from the drum and may be preserved any length of time without danger of its being disfigured. This record I then copy in solid resisting material, preferably metal, either by the purely mechanical process of engraving, or by chemical deposition, or by photo-engraving. I prefer the last-named process, which enables me to produce the most accurate copy of the original record in copper, nickel, or any other metal without in any way or manner affecting the original record. The copy thus obtained, which may be multiplied to any desired extent, is a grooved wave-line upon a strip or sheet of copper or other metal, as shown in Figs. 1, 4, 6, and 7, and for the reproduction of the recorded sounds it has the advantage over the ordinary records in tin-foil, wax, &c., that it is not sensibly attacked by the reproducing-stylus, and will stand an indefinite number of reproductions without the slightest variation in the accuracy and loudness of the reproduced sounds.

The copied record is fixed at both ends to the bars *c d*, as shown in Fig. 7, and is placed



upon the elastic support *y'* upon the drum in the same manner as has been described with reference to the original record-strip, and as is illustrated in Figs. 7 and 4. Care must be taken that the two ends of the undulatory groove *y* meet exactly, as will be readily understood. This condition of the apparatus is shown in Fig. 1 with the engraven record upon the drum and the free end of the stylus entering the undulatory groove. If, now, the drum is rotated with uniform speed, the end of the stylus will be forced to follow the undulations of the groove *y*, and the diaphragm will be vibrated positively in both directions in strict accordance therewith, and will therefore reproduce the exact sounds which originally produced the record. This peculiarity of positive vibratory movement in both directions of the diaphragm is a feature which also distinguishes my method and my apparatus from others heretofore used.

In the phonograph and graphophone the end of the reproducing stylus which bears upon the indented or engraved record has a vertical upward and downward movement. It is forced upwardly in a positive manner by riding over the elevated portion of the record, but its downward movement is effected solely by the elastic force of the diaphragm, which latter is always under tension. In my improved apparatus the stylus travels in a groove of even depth and is moved positively in both directions. It does not depend upon the elasticity of the diaphragm for its movement in one direction. This I consider to be an advantage, since by this method the whole movement of the diaphragm is positively controlled by the record, and is not affected or modified by the physical conditions of the diaphragm, which conditions necessarily vary from time to time and constitute some of the causes of imperfect reproduction of recorded sounds.

In practicing my method of recording and producing sounds I am not limited to the use of the identical apparatus herein shown and described. This apparatus may be varied indefinitely without seriously impairing its utility for the purposes in view. Thus it is not absolutely necessary that a diaphragm should be used for receiving the impact of sound-waves in recording and for remitting sounds in reproducing. Any sonorous body of whatever shape and material may be used in lieu of a diaphragm proper. The recording-surface need not be mounted upon a drum, but may be supported in any suitable manner upon a support of any description which is adapted to move the same under the stylus evenly and with approximately uniform speed. Nor do

I confine myself to the use of lamp-black as a substratum for the phonautographic record, although I have found this substance to yield excellent results. Any other substance which adheres well to the support and may at the same time be removed from the same with a minimum force may be employed.

While I have found the process of photo-engraving to yield admirable copies of the phonautographic record, I do not mean to confine myself to this process to the exclusion of other processes for copying and multiplying the original record in solid resisting material; and it will be readily understood that the details of construction of my apparatus and the manipulations of the same may be greatly changed without departing from the fundamental idea of my invention.

I do not herein claim the apparatus shown and described, either generically or specifically, as a whole or in part, since the same forms the subject of another application for patent previously filed by me and of which this is a division.

What I do claim, and desire to secure by Letters Patent, is—

1. The method or process of recording and reproducing spoken words and other sounds, which consists in first drawing an undulatory line of even depth in a traveling layer of non-resisting material by and in accordance with sound-vibrations, then producing the record thus obtained in solid resisting material, and finally imparting vibrations to a sonorous body by and in accordance with the resisting record, substantially as described.
2. The method or process of reproducing sounds recorded phonautographically, which consists in copying the phonautographic record in solid resisting material, and then imparting vibrations to a sonorous body by and in accordance with the copy of the original record, substantially as described.
3. The method or process of reproducing sounds recorded phonautographically, which consists in copying the phonautographic record in solid resisting material by the process of photo-engraving, and then imparting positive to-and-fro movements to a sonorous body by and in accordance with the copy of the original record, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EMILE BERLINER.

Witnesses:

JULIUS SOLGER,  
JACOB G. COHEN.

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# UNITED STATES PATENT OFFICE.

EMILE BERLINER, OF WASHINGTON, DISTRICT OF COLUMBIA.

## PROCESS OF PRODUCING RECORDS OF SOUND.

SPECIFICATION forming part of Letters Patent No. 382,790, dated May 15, 1888.

Application filed March 17, 1888. Serial No. 367,563. (No model.)

*To all whom it may concern:*

Be it known that I, EMILE BERLINER, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Producing Records of Sounds, of which the following is a specification.

In a patent granted to me November 8, 1887, No. 372,786, I have described a method of recording and reproducing spoken words and other sounds; and in connection therewith and as a part thereof I have described a process of producing a record of sound-waves in solid resisting material by photo-engraving, the phonautographic record of such sound-waves having first been produced as an undulatory line of even depth in a traveling layer of non-resisting material.

My present invention is an improvement upon that described in my aforesaid patent; and it has for its object the production of a record of sound-waves in solid resisting material, principally metal, by the process of direct etching, whereby a solid unchangeable sound-record is obtained more cheaply and more readily, either upon a flat or upon a curved surface, without the delicate and intricate manipulations incidental to the process of photo-engraving. All this will more fully appear from the following detailed description, in which I shall freely refer to what is shown and described in my aforesaid patent as a part of the now common knowledge of mankind.

In accordance with the rules laid down in my patent, I produced a phonautographic record upon a traveling layer of lamp-black or other non-resisting material. Then this phonautographic record was transferred by photo-engraving upon metal, and the metallic record thus obtained was used for reproducing the recorded sounds.

In the course of my experiments I have found that in place of lamp-black other substances may be used as the non resisting medium for receiving the original phonautographic record, and I have also found that among these substances are such as will resist the chemical action of acids, but which offer no perceptible mechanical resistance to the movement of the recording-stylus. Upon this discovery my present invention is based, and it

consists, broadly speaking, in producing a phonautographic record through a film of a suitable etching-ground deposited upon a traveling surface of resisting material, such as metal or glass, and then subjecting said surface to the action of a suitable etching agent, which attacks said surface at the places only where the etching-ground has been removed by the recording-stylus.

The etching-ground, which is to serve as the non-resisting medium for the phonautographic record, I prepare by dissolving beeswax, paraffine, or other like substance in a suitable solvent. By preference I use beeswax, and dissolve the same in benzine, so as to obtain a saturated solution. This solution is filtered, and care is taken to exclude as much as possible all dust, which is always present in the ambient air. The surface which is intended to receive this ground, which may be a flat disk or a cylinder of metal or glass, should be smoothly polished, and must be cleansed and dried. The wax solution is then poured over this surface, so as to cover the same at all points, and the solvent is then allowed to evaporate, which it does in one or two minutes. An exceedingly-fine film of wax then remains adhering to the surface of the metal or glass, and the consistency of this wax is such that it offers no perceptible mechanical resistance to the action of the recording-stylus, while at the same time it resists the chemical action of ordinary etching agents. In this respect the film of wax deposited from the solution is quite different from a layer of wax produced by melting. The latter has such consistency and adheres to the supporting-surface with such tenacity that considerable force must be used to penetrate the same and remove it from its support, while the wax film deposited in the manner described is so delicate that a camel's-hair brush will disturb it perceptibly.

Partly on account of the too great sensitiveness of a single film, and also as an additional protection against the action of the acids employed in the subsequent etching, I ordinarily, but not necessarily, apply a second coating of the solution, which, when dry, leaves a film of wax of such thickness as I have found to answer all requirements. A plate or cylinder thus prepared may be preserved in



definitely, and is at all times in good condition to receive the phonautographic record. Such record is produced by moving the prepared surface under a stylus actuated by sound-waves to remove an undulatory line of the non-resisting film from its support, whereby the latter is laid bare along the said line, as is fully described in my patent above referred to, and as is now well understood by those skilled in the art. The plate or cylinder is then subjected to the action of a suitable etching agent, the nature of which varies according to the material of the support. For metals—such as zinc, copper, or brass—diluted nitric, hydrochloric, or other acid is used, while for glass or other like materials fluoric acid, or the fumes of the same, must be used. In either case I obtain upon the support within a few minutes an undulatory groove of even depth representing the sound-waves which acted upon the recording-stylus, and this groove is of sufficient depth to guide and control a reproducing-stylus in the manner set forth in my Patent No. 372,786.

I do not confine myself to any particular mode of etching, the ordinary process being followed in this respect. The same is true of the practice of rebiting, if a single exposure to the etching agent should prove to be insufficient to produce a groove of sufficient depth. From a record produced in the manner described any number of copies may be obtained by electro-deposition, especially if the original record is etched in metal. In that case, however, I have found it advisable to burnish the original record-groove before the plate or cylinder is placed into the depositing-bath. This is a very simple process, and consists in holding and gently pressing a pointed burnishing-tool in the record-groove while the plate or cylinder is rotated. The tool is held in one hand while the plate or cylinder is rotated by the other. In this manner the burnishing-tool is guided through the record-groove from one end to the other, and the slightly granular structure of the etched groove is thus polished without losing any of its essential characteristics. This process occupies only a very few minutes, and while it improves the galvanic plastic copy obtained from the original record, it is not absolutely essential. In place of a special burnishing-tool the reproducing-stylus may be used, the point of which is ordinarily of hard metal—such as iridium—so that the burnishing is effected by simply using the record once or twice for reproducing the recorded sounds in the ordinary manner.

It has been stated above that the dissolved and filtered wax or other ground should be carefully protected against dust, which is always present in the surrounding air, and it is obvious that the same precaution should also be taken with respect to the plate or cylinder upon which the record is made; but experience has shown that it is almost impossible to guard

effectually against the accession of fine filamentary particles of dust to and into the body of the tracing or etching ground. These dust particles are so fine that they cannot, as a rule, be detected by the most searching inspection of the prepared plate; but they become very conspicuous and a very serious source of annoyance when the record is made. As the recording-stylus passes through the wax or other ground, a fine undulatory line of the latter is removed, and the removed material drops away from the stylus as soon as removed, so that the point of the stylus always remains clean. This, however, is only the case when the ground is free of filamentary impurities; but if filaments of dust are embedded in the ground they adhere to the stylus, and, together with a coating of the ground, are dragged through newly-formed grooves, whereby the latter become uneven and receive ragged edges, which seriously impair the accuracy of the record. I have discovered an effective means for overcoming this difficulty, and it consists in simply moistening the record-surface with a fluid that slightly adheres to the ground and keeping it moist while the record is being made. I have found strong alcohol to be very effective for this purpose when wax is used as a tracing-ground, and it is used by pouring it over the ground just before the plate or cylinder is started to move under the recording-stylus. The alcohol evaporates rapidly, but not so rapidly as to disappear entirely before the record is finished, and this record now shows no trace of inequality, the lines being as sharp and well defined as if cut by a graver. The point of the stylus remains quite clean, and it seems as if the filamentary particles had disappeared. I have no definite theory by which to explain this surprising result. It is possible that the exceedingly-fine dust particles are forced against the walls of the grooves and are there held when the ground is in the peculiar state of dampness which it receives when alcohol is poured over the same. It is also possible that these particles of dust, being probably of organic matter, are dissolved by the alcohol, and it is also possible that both causes operate to keep the point of the stylus clean, so as to make a sharp and well-defined record; but whatever be the mode of action of the alcohol poured over the ground its effect is highly beneficial and its use constitutes one of my improvements.

The film of ground which I employ is so exceedingly thin that it is practically colorless and transparent. The record is for this reason almost invisible to the naked eye. In some cases, however, it is desirable to be able to inspect and scrutinize the record before it is exposed to the action of the etching agent, or to watch the progress of the record, and for this reason it is advisable to slightly color the ground before the record is made. I accomplish this by adding a small quantity of aniline-dye or other coloring-matter to the solu-



tion of wax or other ground. The record is then plainly visible as a pale line upon a dark ground.

Having now fully described my invention, I claim and desire to secure by Letters Patent—

1. The method or process of producing a record of sound-waves in solid resisting material for reproduction of the recorded sounds, which consists in covering the surface of such material with a film of etching-ground that offers no perceptible mechanical resistance, then making a phonautographic record upon and through the etching-ground, and then exposing the record to the action of a suitable etching agent, substantially as described.

2. The method or process of producing a record of sound-waves in solid resisting material for reproduction of the recorded sounds, which consists in depositing upon the surface of such material a film of wax from a solution of the same in a suitable menstruum, then making a phonautographic record upon and through the wax film, and then exposing the record to the action of a suitable etching agent, substantially as described.

3. The method or process of producing a record of sound-waves in solid resisting ma-

terial for reproduction of the recorded sounds, which consists in depositing upon the surface of such material a film of wax from a solution 30 of the same in benzine, then making a phonautographic record upon and through the wax film, and then exposing the record to the action of a suitable etching agent, substantially as described.

4. The method or process of preparing solid surfaces for the reception of a phonautographic record, which consists in depositing upon said surfaces a film of tracing or etching ground and then moistening such film with an adher- 35 ing fluid, substantially as described.

5. The method or process of preparing solid surfaces for the reception of a phonautographic record, which consists in depositing upon said surfaces a film of wax and then moistening 40 the wax film with alcohol, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EMILE BERLINER.

Witnesses:

JOSEPH LYONS,  
S. WOLF.